VOLUME 21
NO. 12

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

DECEMBER, 1932

Western Office
66 E. South Water St.,
Chicago, Ill.

PUBLISHED MONTHLY BY

THE BRUCE PUBLISHING COMPANY

524-544 NORTH MILWAUKEE STREET
MILWAUKEE, WISCONSIN

Eastern Office
40 East Thirty-fourth St.,
New York, N. Y.

TABLE OF CONTENTS

Industrial Arts and Vocational Education in the Convention City, *by O. H. Day*..... 337
Illustrative Material for School Shops, *by John R. Phelps* 341
Editorials 346
Psychology Involved in Teaching Auto Mechanics, *by Stephen Henry Hurtuk*..... 348
Current Comment No. 7 — Variety in Class Conduct, *by Homer J. Smith*..... 349
Coöperating with the Scouts, *by Lee M. Klinefelter* 351

SUPPLEMENT

Twenty-Five-Inch Sailing Sloop, *by Claude William Horst* .....No. 256

PROBLEMS AND PROJECTS

A Twenty-Five-Inch Sailing Sloop, *by Claude William Horst* 353
A Porch Lantern, *by F. E. Tustison* 355
The Kick Sled as a Winter Project, *by Frederick J. Quigley* 356
Circular Saws, Their Characteristics and Use — III, *by John E. Doren*..... 357
Portable Ping-Pong or Indoor-Tennis Table, *by Jos. J. Lukowitz* 358
Football Score Board, *by P. T. McHenry*..... 358
Now, Are There Any Questions? 360
Among Industrial-Arts Teachers 360
Associations and Conventions 360
New Publications 8a
News Notes..... 8a
School Shop Equipment News 10a

THE ANNUAL INDEX

The December issue finishes Volume 21 of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION.

For those who desire it, a title page and index have been prepared. A postal is all that is needed to secure one.

Besides the alphabetical list of the authors, the index contains the titles of all articles grouped under subject heads such as auto mechanics, electricity, general shop, metal work, printing, etc.

—◎—

THIS MONTH'S COVER

The industrial-practice picture chosen for the cover this month, shows a toolmaker grinding what might be termed the back of the cutter, with reversed grinding wheel on a universal tool and cutter grinding machine.

This picture appeared first on the cover of *Grits and Grinds*, a small periodical issued by the Norton Company, Worcester, Mass.

—◎—

ANOTHER CONVENTION DATE

Dec. 28 — Ohio Vocational Association, held at Columbus, Ohio.

—◎—

DON'T FORGET

Hold open December 7, 8, 9, and 10 and attend the American Vocational Association Convention at Kansas City. Read about the convention on pages 337, 346, and 360 of this issue, then make your reservation. The Muelbach Hotel will be the headquarters.

Articles Indexed—The articles contained in the Magazine are regularly indexed in "The Reader's Guide to Periodical Literature," and "Education Index."
Entered Jan. 2, 1914, as second-class mail matter at Milwaukee, Wis., under Act of March 3, 1879. Copyright, 1932, by Bruce Publishing Co. Title registered as Trade Mark in U. S. Patent Office, Nov. 25, 1930.
Subscription Information—Subscription price, $2.50 per year, payable in advance. Canadian postage and tariff, $1.00, foreign countries, 50 cents. Copies not over three months old, 25 cents; more than three months, 50 cents. Notices for discontinuance of subscription must reach Publication Office in Milwaukee, at least fifteen days before date of expiration. Changes of address should invariably include old as well as new address. Complaint of nonreceipt of subscribers' copies cannot be honored unless made within fifteen days after date of issue.
Editorial Contributions.—The Editors invite contributions bearing upon Industrial Arts, Vocational Education, Manual Training, and related subjects. Manuscripts, drawings, projects, news, etc., should be sent to the Publication Office in Milwaukee. Contributions are paid for at regular space rates. In all cases manuscripts should be accompanied by full return postage.
The Magazine is on sale at Brentano's, New York; Wanamaker's, Philadelphia; Brentano's, Chicago; Philippine Education Co., Manila, P. I.

PEASE
CHICAGO

Why not Modernize Your School Drafting Room?

Install a Special School Model Blue-Printing Equipment!

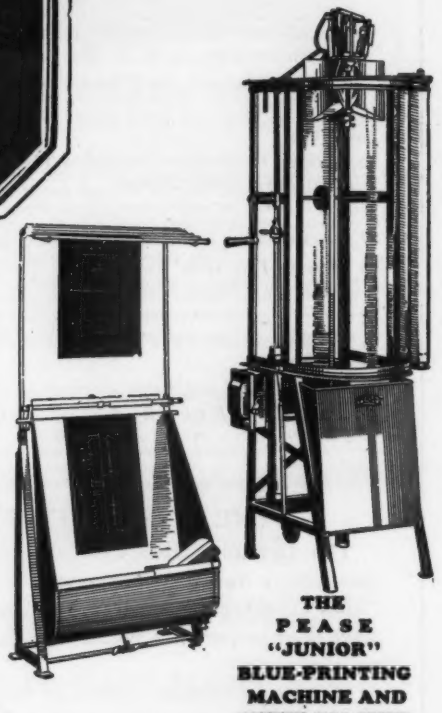
THE Pease "Junior" Blue-Printing Equipment has real class room value. You can teach students "The Art of Making Blue-Prints" right along with their studies and at the same time, turn out first-class reproductions of daily school bulletins, charts, diagrams, etc., at low cost.

The Pease "Junior" Machine can be plugged directly into the lighting circuit and will handle blue-prints, negative prints etc., any size up to 24 x 36". It is equipped with an *enclosed* arc lamp that prevents dust, offensive fumes and odors and eliminates all fire-hazard. The "Junior" Sheet Washer has both spray pipe and drain pipe, eliminating open trays of water and wet floors. Initial investment is small . . . operating expense is reduced to a minimum . . . and the complete equipment can be stood in a corner of the school drafting room.

Ask for Special School Catalog MJ-02X

THE C. F. PEASE COMPANY
802 North Franklin Street
Chicago Avenue Station
Chicago, Illinois

PEASE



THE PEASE "JUNIOR" BLUE-PRINTING MACHINE AND SHEET-WASHER

THE PEASE "JUNIOR" SHEET DRYER

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

VOLUME 21 DECEMBER, 1932 NUMBER 12

Industrial Arts and Vocational Education in the Convention City

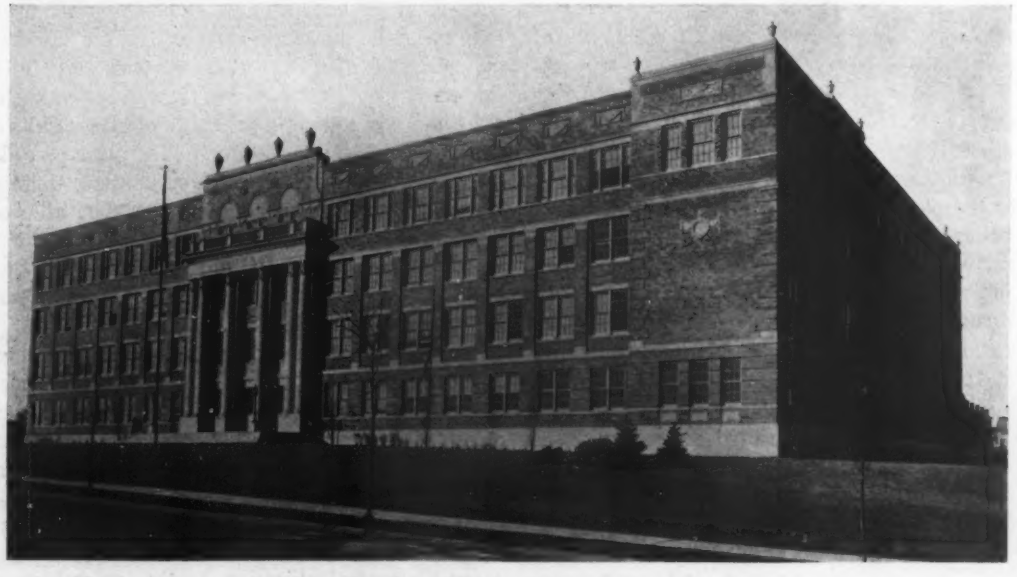
*O. H. Day**

IN describing any program of vocational and practical-arts education it is first necessary that the outstanding characteristics of the city be stated. Our school district has a population of 483,000 scattered over a rather wide area. From a commercial and industrial viewpoint, Kansas City would be classed as a center of distribution. It is true that we have a number of rather large industries, both in our city and across the state line in Kansas City, Kansas, which draw largely on our citizens for their workers. Among these industries you will find large packing plants, the second largest stockyards in the world, soap factories, steel-tank factories, sash and door factories, grain elevators, flour mills, a number of large printing establishments, and many other widely diversified industries. However, Kansas City is largely noted for her wholesale and jobbing business. Our city is commonly referred to as "The Gateway to the West," because a number of the transcontinental and western railroad and air lines pass through our station and form a system of distribution to the West and the Southwest.

*Director Vocational Education, Kansas City, Mo.

From the above very brief description it is evident that our population spreads itself over a great many occupations, and that no one industry is dominant as in some cities where steel or some such product is the controlling factor.

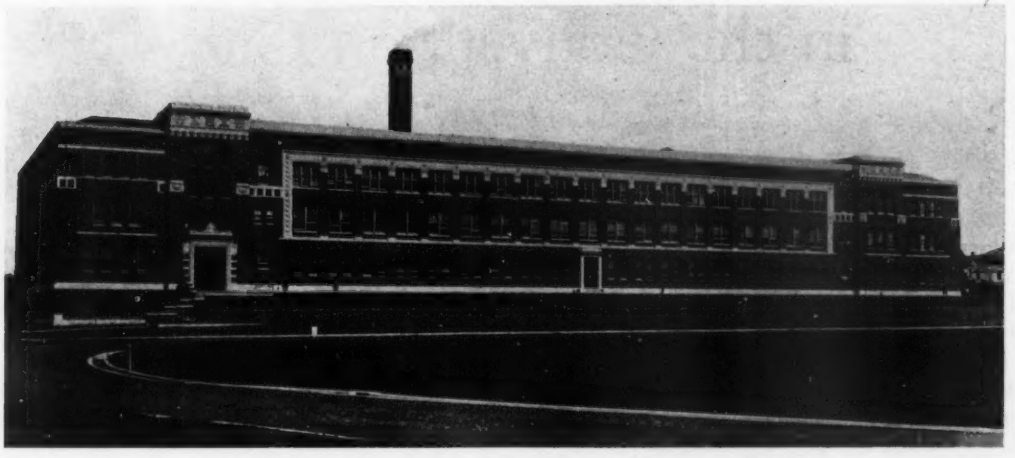
Our school system begins its activities in the kindergarten, which is operated as a unit of the public schools, and proceeds through the grades, high schools, and trade schools, offering in addition two years of junior college work and four years of teachers' college work. The work of the elementary schools is completed in seven years, and it might be said that our schools are organized on the six-two-three plan; that is, we have six years of elementary work, two years of junior-high-school work (composed of the last year of the elementary school and the first year of the high school), and three years of senior-high-school work.



SOUTHWEST HIGH SCHOOL, KANSAS CITY, MISSOURI

The department of vocational education and practical arts is a unit composed of all practical activities for both boys and girls. In this department we have all of the shopwork in all schools, the drafting, the trade work, part-time work, evening work, and home economics. The big objective of the department is to develop a correlated, coördinated program of practical education so that each child may find something of interest and worth in the instruction offered.

Our work in the day school for boys is divided into four major divisions; namely, elementary schools, junior high schools, senior high schools, trade schools. The practical-arts work in the elementary grades covers three principal subjects. It opens in the sixth grade and covers the elements of mechanical drawing, woodwork, and home mechanics. The drawing is given during the first ten weeks of each year and is limited largely to simple free-hand sketching and lettering to teach the boys the elements of orthographic projection and plan reading. The instruction in woodwork is of quite the usual type in which fundamental woodworking tool processes are taught by means of rather simple projects.



CENTRAL JUNIOR HIGH SCHOOL, KANSAS CITY, MISSOURI

We believe that our entire program of practical arts in the elementary schools must appeal to quite a large extent to the play instinct in our boys and girls. We further believe that these courses must be made flexible and attractive, if they are to function as they should.

Our junior-high-school industrial-arts program for boys is organized on the multiple-experience shop plan, with vocational and educational guidance as its major objective. It is our desire that the students in the junior high school shall study occupations and workers. We want them to become acquainted not only with the world of work, but with the workers themselves. We try to make use of the fact that children of junior-high-school age are by very nature experimentally minded. They wish to try out a great many things. They crave experiences, they fret under restraint, and they are constantly shifting from one interest to another. To meet these and many other conditions that exist in the minds of the average junior-high-school child, we have organized our industrial-arts program around four major groups of activities; namely, the graphic arts, the building trades, the metal trades, and the cabinet trades. Industrial arts is a required subject in the seventh grade in the junior high schools, and each child is rotated in ten-week periods through the four major divisions. In each of these major divisions he comes in contact with four or five type trades or occupations. For example: In the metal-trades shop we show him something of the machine trades, the forging and heat-treating trades, sheet-metal work, auto mechanics, and electricity. And so it is in each of the four groups. In these shops, skill and a finished product are incidental objectives. We try to interest the boy in learning about the trade or occupation itself, together with those occupations that branch out of it, and we also encourage him to study the work to ascertain its requirements and rewards. We wish this information to be broad in its scope. In other words, we trust that this work will start the boy to making a study of the world's activities in which he must later find a place. We do not emphasize nor minimize any occupation or group of occupations. We want him to feel that all work is worth while and dignified just insofar as he takes worth and dignity to it; and we further try to bring to him a conception of the worth of definite training for each occupation.

During the second year in the junior high school the work is elective and the child is allowed to choose any one of the activities and carry it on for a semester or a year. The training he gets will be the same as he would receive in a freshman-year shop of a four-year high school.

As in the junior high schools, so in the senior high schools our program of industrial arts is organized around a central objective. In the junior high school

the major objective was a study of men and their work. In the senior high school the objective shifts to a study of materials and their applications.

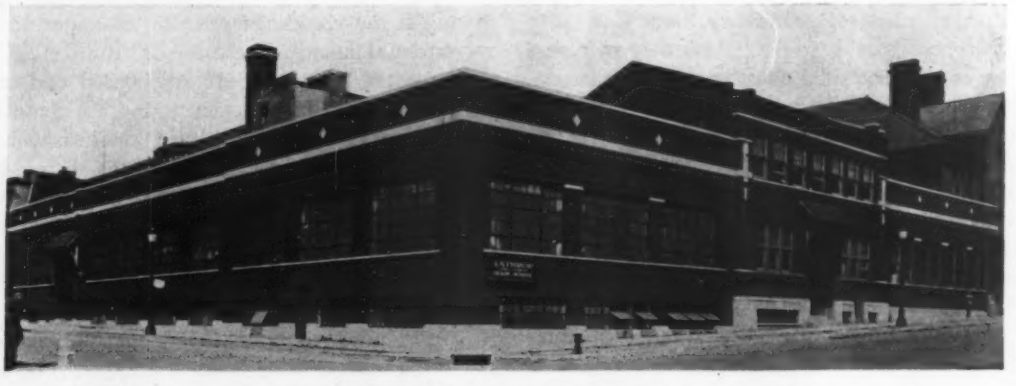
In order to carry out our major objectives of studying materials and their application to industry and industrial life, we have four major types of activity in our senior high schools. Our drafting courses are proceeding very much as in the past, except that we are coördinating the instruction in drafting from the elementary schools through the junior and senior high schools, and are eliminating, so far as possible, duplication of effort. We also believe that in many cases the drafting instruction in the high schools has been of college grade and not sufficient attention has been given to thorough instruction in those principles and practices which should normally enter a high-school drafting course.

Our instruction in woodwork is being reorganized so that we now have general woodworking shops and courses. It is the purpose of these courses to study woods, their geographic characteristics, and methods of manufacture and their application in industry. Hence, we do not unduly emphasize any one phase of woodwork, such as cabinet construction, but rather we draw attention to the various uses to which wood is put. We do some cabinet work, some pattern work, and some carpentry, or any other activity which will assist in showing the boy the real worth and place of wood and its allied materials in industry. Wherever possible we use group projects and do our work on a fairly large scale.

high-school-shop equipment. One end of the shop is given over to automobiles. The other end contains a heat-treating furnace, a forge, a sheet-metal bench, an acetylene welding outfit, a milling machine, a grinder, engine lathes, drill presses, a shaper, and the necessary hand tools and equipment. We find that these equipments are less expensive than either a machine shop or a forge shop, and are of much greater interest to the student.

The other principal type of shop in our high schools is devoted to printing, and is equipped as most school print shops are — with job presses, a cylinder press, type stands, composing tables, and the like. In these shops we print our school papers and do other types of printing, not with the idea of training printers, for we know that few of our students will ever become printers, but with the purpose of teaching them to become intelligent purchasers of printing and to appreciate that printing is an art and a very important factor in preserving and communicating the ideas of men and women.

This brief description of our senior-high-school shops will give you an idea of what we are doing and what we are hoping to do in the future. We recognize several types of students in the senior high schools who must be served. There is the boy who is preparing for college, the boy who is preparing to go out as a junior technician without college training. There is the boy on the fence who needs further vocational and educational guidance, and last, but by no means least, there is the boy who is attending high school merely be-

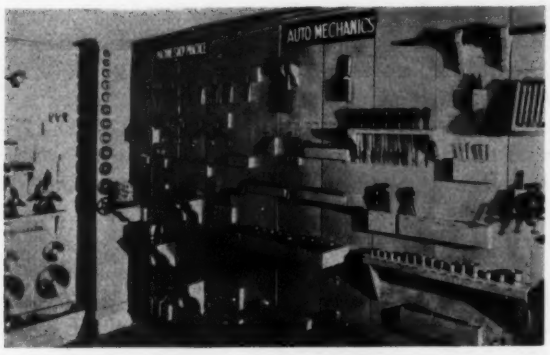


LATHROP POLYTECHNIC INSTITUTE, KANSAS CITY, MO. A PUBLIC TRADE SCHOOL FOR BOYS. THIS UNIT WAS BUILT BY THE STUDENTS

Our third type of activity in the senior high school is the general metal shop, the major objectives and methods of work being largely the same as for the woodworking shop, except that we use the automobile to a large extent as the teaching medium because it involves in its construction practically every common industrial metal. We do not teach automobile repair and maintenance except as a part of the instruction in metal work. The major units of equipment in these metal shops may be of some interest to you, because there is something of a departure from the ordinary

cause father and mother tell him to and there is nothing else for him to do. He must be interested and instructed and not allowed to drift.

In Kansas City as well as in many other cities, we realize that a large portion of our students will eventually find their places in the world through the avenue of trade or craft work, and that they will not find in the high school the instruction they desire or need. Therefore, we provide definite work instruction, preparing boys and girls to enter a trade or a craft at the close of their secondary-school life. We have three



SHOWING TOOL RACKING, METAL TRADES SHOP, NORTHEAST JUNIOR HIGH SCHOOL, KANSAS CITY, MISSOURI

such schools in Kansas City: the Jane Hayes Gates Institute for Girls, the Lathrop Polytechnic Institute for Boys, and the Trade Department of the Lincoln High School for Negro Boys and Girls. As in the other schools, so in these, we have an underlying philosophy upon which the work is founded. We believe it to be the function of a trade school to prepare boys and girls to work. They are not college preparatory institutions, they are not high schools, they are trade schools — work schools — whose ideal must always be "honest, high-grade craftsmanship." The first requirement of the teachers in these schools is that they must be masters of their trades so that they can command the respect not only of the students but of the workmen throughout the city.

We believe that the only satisfactory way to train boys and girls to work is to have them work on real jobs with a standard of proficiency, both in quality and quantity, comparable to that which they will meet when they enter the craft. Following out this thought, our trade schools believe that the statement made in the Smith-Hughes Law which says "the instruction shall be on a useful and productive basis" is sound, and we are carrying it into practical application. In these schools the students do not make products or projects for themselves which they may take home, but they do work on a productive basis for the board of education. We build our own buildings with the students, make our own furniture, do our own printing, repair our own electrical machinery, and a wide variety of other work, so that in each trade the students are working on products, the worth of which they know and which they may see put into actual use. For example: We needed a new unit of our building at the Lathrop Polytechnic Institute. Our board of education gave us an appropriation of $60,000 with which to build this unit. The school architect drew the plans and wrote the specifications, and our boys did the work. We hired a building superintendent just as would be done by a contractor. We bought our own materials and our instructors acted as foremen on the job. As the work was carried forward the boys received their instruction, and now that the building is completed we shall be glad to subject it to your inspection, knowing that it will compare favorably with a similar building put up by contract.

Thus, we do large quantities of work, and while it is true that we do effect a considerable saving of money for the school district, yet this is not the objective. We know that following this plan, when our boys and girls apply for entrance into the world of work, that they have training which they can sell. They are accustomed to having their work measured as it will be measured by their employers, hence their transition from school life to work life is not a shock but a very gradual process for them.

I am sure you will appreciate that this is a very meager description of our method of instruction in the trade schools. Students applying for entrance into the trade schools must be elementary-school graduates or better. We have a great many students coming into our trade schools from the high schools, and we are encouraging the high-school graduates to enter the trade school for postgraduate work in concentrated trade instruction. We have two good classes composed of such high-school graduates.

Our evening-school work is organized along the lines suggested in the federal vocational education law and is for the benefit of people working at various trades and occupations. Our classes are conducted by thoroughly competent tradesmen, a number of whom are not on our regular day staff. Many of the classes meet in places outside of the school building, in fact we promote this practice for a number of reasons which are obvious.

Another activity which I shall merely mention in passing is the vocational program in connection with our parental homes. These are institutions in which wards of the juvenile court are housed and trained. They are located in the country and are complete institutions within themselves. In these schools each child is taught to work. The children do practically all the work of the home and the farms, such as the care of the stock, the care of the garden and farm tracts, construction, repair and maintenance of the buildings, etc. Just at this time we have under construction at one of these homes a large building which will include a gymnasium, an auditorium, and shops. All of the work is being done by the boys. This is only typical of the kinds of projects undertaken.

By way of summary: I have attempted very briefly to describe our program as it is carried on for boys. I trust I have shown you that our effort is to make the program consistent and progressive. It is our desire that our schools shall offer suitable instruction to all of the children of all our people. We are emphasizing the fact that every child must eventually participate in some of the world's activities; in other words, that each child must eventually become a worker, and we want him while he is with us to develop a respect for work and a realization that has been so aptly expressed by Henry Van Dyke: "Heaven is blessed with perfect rest, but the blessing of earth is toil."

Illustrative Material for School Shops

*John R. Phelps**

ILLUSTRATIVE materials of various kinds, and on many subjects, have been made available by the manufacturers of different products. Some of this material concerns only the finished product and its uses, while some of it gives much information about the raw materials used, and the problems encountered in manufacturing. The purpose of this investigation has been to list and briefly describe some of this illustrative material, which might be used to advantage in the teaching of industrial-arts subjects in the junior high school.

The material collected has been organized under six main headings: auto mechanics, concrete work, electrical work, metal work, printing, and woodworking. Under each of these main headings, two divisions have been made: (1) motion picture films, and (2) booklets. In the case of metal work, a list of booklets concerning sheet-metal work was added. Much material was found which might be used in the teaching of woodworking, hence under the division devoted to films there also is listed one that has to do with finishing work. The booklets under woodworking have been arranged under the following subheadings: booklets, tools and machines, and finishing materials. Another division labeled "charts" has been added under this subject so that these might be listed separately. In the other subjects there were not enough charts available to warrant this separate division.

*Post Road Junior High School, White Plains, New York.

AUTO MECHANICS

Films

The Story of a Gasoline Motor — No. 94. Three reels, 16 and 35 mm. The operation, manufacture, and testing of a gasoline motor. (1 — N.C.T.)

The Story of a Storage Battery — No. 100. Two reels, 16 and 35 mm. The invention, manufacture, and testing of modern storage batteries. (1 — N.C.T.)

The Power Within — No. 136. Three reels, 16 and 35 mm. The production and use of the power developed by internal-combustion engines. (1 — N.C.T.)

Along the Firing Line, or the Story of a Spark Plug — No. 106. Two reels, 16 and 35 mm. The operation, manufacture, and testing of spark plugs. (1 — N.C.T.)

The Story of Gasoline — No. 99. Three reels, 16 and 35 mm. The oil fields and the manufacture of gasoline. (1 — N.C.T.)

The Story of Lubricating Oil — No. 120. Two reels, 16 and 35 mm. The manufacture and use of petroleum lubricants. (1 — N.C.T.)

Carbon Monoxide, the Unseen Danger — No. 134. One reel, 16 and 35 mm. The danger of running an automobile engine in a closed garage. (1 — N.C.T.)

The Story of Lead Mining and Milling — No. 109. Three reels, 16 and 35 mm. (1 — N.C.T.)

The Story of Lead Smelting — No. 112. Two reels, 16 and 35 mm. (1 — N.C.T.)

The Romance of Rubber — No. 1676, 16 mm.; No. 1376, 35 mm. Two reels, 16 and 35 mm. The production of rubber. (2 — N.C.T.)

Booklets and Charts

Bear System Service Manual. Instructions on wheel aligning, axle and frame straightening. (3 — F.)

Official Wheel Alignment Specification Charts, Form 250; also Instruction Wall Charts. Relating to the operation of Bear wheel aligning, axle- and frame-straightening equipment. (3 — F.)

Brake Service Bulletin. Instructions for servicing all of the popular kinds of brakes used on automobiles. (4 — 50c)

Code

N.C.T. — No charge except for cost of transportation.
F. — Free for one or two copies.
F.O. — Free to teachers; others pay price indicated.

1. Department of Commerce, Bureau of Mines, Pittsburgh, Pa.
2. The Y.M.C.A. Motion Picture Bureau, 347 Madison Ave., New York, N. Y., or 19 S. La Salle St., Chicago, Ill.
3. Bear Manufacturing Co., Rock Island, Illinois.
4. The Raybestos Division of Raybestos-Manhattan, Inc., Bridgeport, Conn.
5. The Simplex Piston Ring Company, of America, 1966 E. 66th St., Cleveland, Ohio.
6. Chevrolet Motor Co., Detroit, Mich.
7. Ford Motor Company, 3674 Schaefer Road, Dearborn, Mich.
8. Auburn Automobile Co., Auburn, Ind.
9. Buick Motor Car Co., Flint, Mich.
10. Chrysler Sales Corporation, 12200 E. Jefferson Ave., Detroit, Mich.
11. De Soto Motor Company, Mt. Elliott and Lynch Rd., Detroit, Mich.
12. Plymouth Motor Company, Mt. Elliott and Lynch Rd., Detroit, Mich.
13. Amplex Mfg. Company, 7900 Jos. Campau Ave., Detroit, Mich.
14. Dodge Brothers Corporation, Detroit, Michigan.
15. Hudson Motor Car Corporation, Detroit, Mich.
16. Hupp Motor Car Corp., Detroit, Mich.
17. Buick-Oldsmobile-Pontiac Sales Co., General Motors Bldg., Detroit, Michigan.
18. Olds Motor Works, Lansing, Mich.

Braking. The official Raybestos service reference manual. (4 — F.)

How to Install Panther Piston Rings. Instructions for installing Simplex piston rings. (5 — F.)

Chevrolet Repair Manual. Very comprehensive instructions for doing all repair-work on Chevrolet cars. (6 — F.)

Chevrolet Motor Cars. Instructions for the operation and care of Chevrolet motor cars — International Series AC, Universal Series AD, and Independence Series AE passenger cars. (6 — F.)

Service News. A monthly magazine giving the latest features on Chevrolet cars and accessories. (6 — F.)

Instruction Book, Ford 4-Cylinder Cars and Trucks. (7 — F.)

Model A Instruction Book. (7 — F.)

V8 Instruction Book. (7 — F.)

Auburn — 120 Model. Instructions for care and operation of Auburn motor cars. (8 — 10c)

Buick Reference Books for 1930, 1931, and 1932 Models. (9 — F.)

Specifications and Adjustments for 1931 Models. (9 — F.)

Buick Shop Manual — 1930 Model. Instructions for repairwork on this model. (9 — F.)

Lubrication Charts for the 1928, 1929, 1930, 1931, and 1932 Models. (9 — F.)

Chrysler Cars. Instruction books for Chrysler 66, 70, 77, and Imperial. (10—F.)

De Soto Cars. Instruction book for the De Soto Six. (11 — F.)

Plymouth Cars. Instruction book. (12 — F.)

Chrysler Marine Engines. Instruction book. (13 — F.)

Dodge Car. Instruction books for the Dodge Eight and Dodge Six. (14 — F.)

Special Service Tools. Designed and recommended for servicing Dodge cars, trucks, etc. (14 — F.)

Hudson and Essex. Instruction books for Hudson and Essex cars. (15 — F.)

Hupmobile. Instruction books for Hupmobile cars. Lubrication charts for each model. Set of service bulletins covering brakes, clutch, electrolock, steering gear, shock absorbers, fuel pump, and specifications for important adjustments. (16 — F.)

Pontiac Booklets. Construction and Specifications; Demonstration Manual; also wall charts showing some of the special features. (17 — F.)

Oldsmobile and Viking. Operation manuals for the 1930, 1931, and 1932 models. (18 — F.)

Compression Leaks. Grinding valves, lapping, scored cylinders, and fitting rings to pistons. (19 — F.)

Home and Auto Repairs. How to make repairs with iron cement. (20 — F.)

Smooth-On Handbook. Describing how Smooth-On is used for many purposes. (21 — F.)

A Reference Book of Garage Tools. Instructions for using reamers in automobile repairwork. (21 — F.)

A Solution for Your Cleaning Problems. On cleaning parts, car washing, radiator cleaning, floors, and driveways. (22 — F.)

The R.M.A. Manual of Tire Repairing. The repair of passenger car and truck tires, and the retreading of pneumatic tires. (23 — F.)

Air Compressors. This catalog contains much valuable information about air compressors for garage work. (24 — F.)

The Stromberg Plain-Tube Carburetor. The principles of carburetion. (25 — F.)

Service Bulletins and Wall Charts of Late-Type Carburetors. DD, EE, EC, DXC, DX, DXR, UUR-2 Twin Carburetor, the UR Carburetor, and later models. (25 — F.)

Latest Shop Practice — No. 30. Booklet showing latest method of servicing parts of automobiles, trucks, busses, and tractors. (26 — F.)

Auto Servicing Manual — No. 32. Illustrates, describes, and lists 55 major auto-servicing jobs. (26 — F.)

Modern Methods of Differential Drive Gear and Pinion Installation. The installation and the proper adjustment of differential gears. (27 — F.)

CONCRETE WORK

Films

Cementing the Centuries — No. 1353. Two reels, 35 mm. The story of Alpha cement. (2 — N.C.T.)

Concrete Road Construction. Two reels, 35 mm. Highway building with concrete. (28 — N.C.T.)

From Mountain to Cement Sack — No. 148. One reel, 16 and 35 mm. Showing how Portland cement is made. (1—N.C.T.)

Construction That Endures — No. 149. One reel, 16 and 35 mm. How and where concrete is used. (1 — N.C.T.)

Booklets

Concrete Improvements Around the Home. Suggestions for the use of concrete in constructing steps, walks, etc. (29 — F.)

Permanent Farm Construction. Describes proper way to build floors, watering troughs, fence posts, etc. (29 — F.)

Course in Concrete Construction. For junior high schools. (30 — 25c)

Alpha Cement — How to Use It. A practical handbook on cement buildings and improvements. (31 — F.)

ELECTRICAL WORK

Films

The Story of an Electric Meter — No. 84. Three reels, 35 mm. The making, testing, and use of various types of meters. (1 — N.C.T.)

Story of a Storage Battery — No. 100. Two reels, 16 and 35 mm. The manufacture, testing, use, and care of a modern storage battery. (1 — N.C.T.)

The Inside Story of Your Telephone — No. 1133. Two reels, 35 mm. The raw products that are used in the manufacture of a telephone. (2 — N.C.T.)

That Little Big Fellow — No. 1309. One reel, 35 mm. The functions of the electrical current in making a telephone call. (2 — N.C.T.)

The Electrical Transmission of Speech — No. 1363. One reel, 35 mm. Shows how the voice is transmitted over wire circuits. (2 — N.C.T.)

Behind the Pyramids — No. N1029. Three reels, 35 mm. Making carbon brushes for electric motors. (2 — N.C.T.)

Long Drawn Out — No. 1366. One reel, 35 mm. A trip through the copper wire mill. (2 — N.C.T.)

Light of a Race — No. 37. Two reels, 16 and 35 mm. The development of artificial illumination. (32 — N.C.T.)

The Busybody — No. 39. One reel, 16 and 35 mm. The value of the electric motor. (32 — N.C.T.)

Thomas A. Edison — No. 41. One reel, 16 and 35 mm. The development of the incandescent lamp. (32 — N.C.T.)

Power Transformers — No. 47. Two reels, 16 and 35 mm. The development and manufacture of power transformers. (32 — N.C.T.)

Making Mazda Lamps — No. 59. Two reels, 16 and 35 mm. The manufacture of lamps and the development of lighting. (32 — N.C.T.)

The Electric Needle — No. 52. One reel, 16 and 35 mm. Electric arc welding. (32 — N.C.T.)

The Romance of Power — No. S-2130. Two reels, 16 and 35 mm. How electric power is adapted to the needs of men. (32 — N.C.T.)

William Stanley and the Transformer — No. S-2175. One reel, 16 and 35 mm. The theory of the transformer. (32 — N.C.T.)

Mountains of Copper — No. S-2220. One reel, 16 and 35 mm. How copper is mined. (32 — N.C.T.)

Code

19. Clover Manufacturing Co., Norwalk, Connecticut.
20. Smooth-On Manufacturing Co., 568 Communipaw Ave., Jersey City, N. J.
21. Keystone Reamer & Tool Co., Millersburg, Pa.
22. Oakite Products, Inc., 22 Thames St., New York, N. Y.
23. The Rubber Manufacturers Association, 250 West 57th St., New York, N. Y.
24. Curtis Pneumatic Machinery Co., 1918 Kienlen Ave., St. Louis, Mo.
25. Bendix Stromberg Carburetor Company, South Bend, Ind.
26. South Bend Lathe Works, South Bend, Ind.
27. Automotive Gear Works, Inc., Richmond, Ind.
28. U. S. Department of Agriculture, Bureau of Public Roads, Washington, D. C.
29. Portland Cement Association, 33 W. Grand Ave., Chicago, Ill.
30. Division of Industrial Education, State Teachers College, Santa Barbara, California.
31. Alpha Portland Cement Company, Easton, Pa.
32. General Electric Company, Visual Instruction Section, 230 S. Clark St., Chicago, Ill.
33. American Steel & Wire Company, 208 S. La Salle St., Chicago, Ill.
34. Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.
35. Driver-Harris Company, Harrison, N. J.
36. Weston Electrical Instrument Corp., Newark, N. J.
37. The Electric Storage Battery Co., Philadelphia, Pa.
38. National Carbon Company, Inc., 230 N. Michigan Ave., Chicago, Ill.
39. Aluminum Company of America, Advertising Department, 2400 Oliver Bldg., Pittsburgh, Pa.
40. Greenlee Tool Co., Rockford, Ill.

Mountains of Copper — No. 60. One reel, 16 and 35 mm. Modern methods of production. (32 — N.C.T.)

The Benefactor — No. 20. Two reels, 16 and 35 mm. The story of Thomas A. Edison. (32 — N.C.T.)

Wizardry of Wireless — No. 40. Two reels, 16 and 35 mm. The development of communication. (32 — N.C.T.)

Mazda Lamps Preferred — No. S-2248. Four reels, 35 mm. In sound. (32 — N.C.T.)

The Life of Thomas A. Edison — No. S-2259. One reel, 35 mm. In sound. (32 —N.C.T.)

The Story of Steel and Wire Products. Four reels, 35 mm. The manufacture of steel and wire products. (33 — N.C.T.)

Laying of Electrical Insulated Power Cables. One reel, 35 mm. Fifteen-minute showing. (33 — N.C.T.)

Manufacture of Paper-Insulated Power Cables. Three reels, 35 mm. Forty-five minute showing. (33 — N.C.T.)

Making of American Wire Rope. Two reels, 35 mm. Twenty-minute showing. (33 — N.C.T.)

Westinghouse Works. Two reels. Describing the process of an order through the Westinghouse shops. (34 — N.C.T.)

White Coal. Two reels. How electricity is produced from our waterfalls. (34 — N.C.T.)

Evolution of the Transformer. Lecture and slides, showing the transformer from Faraday to modern times. (34 — N.C.T.)

History of the Watt-Hour Meter. Lecture and slides, showing how electric current is measured. (34 — N.C.T.)

Latest Developments of Switchboard and Portable Instruments. Lecture and slides, showing a.c. and d.c. measuring instruments. (34 — N.C.T.)

Booklets and Charts

Nichrome — R-32. The manufacture of, data, and specifications pertaining to alloys for electrical resistance. (35 — F.)

Electrical Testing in Industry. Problems met in the electrical industry. (36 — F.)

Theory and Principle of Electrical Measuring Instruments — Monograph B-7. (36 — F.)

Set of Job Sheets. Intended for high schools or vocational schools giving a vocational or industrial course. (36 — F.)

Charts. D.C. permanent-magnet movable-coil instrument, movable iron and dynamometer-type instruments. (36 — F.)

Wall Chart. Shows the component parts of the storage battery, as well as the chemical action which takes place within the battery at time of charge and discharge. (37 — F.)

Fundamentals of a Storage Battery. Describing how a storage battery functions. (37 — F.)

Instructions for Installing and Operating Exide Batteries. A description of how the battery is used. (37 — F.)

Dry Battery Handy Book. A primer of electricity; principles of electricity and some practical applications. (38 — F.)

Electroplating Aluminum — No. 68. (39 — F.)

Tools for Carpenter, Electrician, and Plumber. (40 — F.)

METAL WORK

Films

Heat Treatment of Steel — No. 102. Two reels, 16 and 35 mm. The modern method of heat treating steel. (1 — N.C.T.)

The Story of Copper—Mining — No. 126. Five reels, 35 mm. Methods of mining copper in the United States and other countries. (1 — N.C.T.)

The Story of Copper—Milling — No. 127. Two reels, 35 mm. The preparation of copper for smelting. (1 — N.C.T.)

The Story of Copper—Smelting — No. 128. One reel, 35 mm. The smelting of copper in blast furnaces. (1 — N.C.T.)

The Story of Copper—Refining — No. 129. Two reels, 35 mm. Methods used in the refining of copper. (1 — N.C.T.)

The Story of Iron — No. 132. Five reels, 16 and 35 mm. The mining and manufacture of iron. (1 — N.C.T.)

Making It Tough — No. 138. Three reels, 16 and 35 mm. The manufacture of alloy steel. (1 — N.C.T.)

Manufactured Abrasives — No. 76. Three reels, 16 and 35 mm. Development and method of manufacturing artificial abrasives. (1 — N.C.T.)

The Story of Lead Mining — No. 109. Three reels, 16 and 35 mm. (1 — N.C.T.)

The Story of Lead Smelting — No. 112. Two reels, 16 and 35 mm. (1 — N.C.T.)

The Story of Steel—Mining and Metallurgy — No. 143. Two reels, 16 and 35 mm. (1 — N.C.T.)

The Story of Steel—Rails, Rods, and Plates — No. 144. One reel, 16 and 35 mm. (1 — N.C.T.)

The Story of Steel—Rail Products — No. 145. One reel, 16 and 35 mm. (1 — N.C.T.)

The Story of Steel—Lap-Welded Pipe — No. 146. One reel, 16 and 35 mm. (1 — N.C.T.)

The Story of Steel—Sheet and Tin Plates — No. 147. One reel, 16 and 35 mm. (1 — N.C.T.)

The Story of Steel and Wire Products. Four reels, 35 mm. From the mine to the rolling mill. (41 — N.C.T.)

The Making of Steel. Two reels, 35 mm. The mining and manufacture of iron and steel, and the making of coke. (42 — N.C.T.)

The Story of Steel and Wire Products. Four reels, 35 mm. The manufacture of steel and wire products. (33 — N.C.T.)

Making of American Wire Rope. Two reels, 35 mm. Twenty-minute showing. (33 — N.C.T.)

The Story of Monel Metal. Two reels, 16 and 35 mm. The uses and applications of monel metal. (43 — N.C.T.)

Hot-Rolled Products — No. 1115, 35 mm.; No. 1657, 16 mm. One reel, 16 and 35 mm. The manufacture of rails and heavy plates. (2 — N.C.T.)

The Manufacture of Steel Sheets and Tin Plates — No. 1118. One reel, 35 mm. (2 — N.C.T.)

The Story of Alloy Steel — No. 1024. Two reels, 35 mm. (2 — N.C.T.)

The Story of Steel — No. 1114, 35 mm.; No. 1656, 16 mm. Two reels. The basic process of making steel. (2 — N.C.T.)

The Manufacture of Wire Products — No. 1116, 35 mm.; No. 1658, 16 mm. One reel. Drawing wire, making nails, fence, barbed wire, and wire rope. (2 — N.C.T.)

The Making of Steel — No. 1346. Two reels, 35 mm. From ore mine to the blooming mills. (2 — N.C.T.)

Use and Abuse of Twist Drills. Two reels, 35 mm. (44 — N.C.T.)

Modern Manufacture with a Stable Arc Welder. Three reels, 16 and 35 mm. Applications of welding, and the history of commercial uses of welding. 35 to 40 min. (45 — N.C.T.)

Welding the Upper Carnegie Building. Three reels, 16 mm. Thirty-five to forty minutes. (45 — N.C.T.)

Welded Steel House. Two reels, 16 mm. Twenty to twenty-five minutes. (45 — N.C.T.)

Mountains of Copper — No. S-2220. One reel, 16 and 35 mm. How copper is mined. (32 — N.C.T.)

Mountains of Copper — No. 60. One reel, 16 and 35 mm. Modern methods of production. (32 — N.C.T.)

The Molder — No. 50. One reel, 16 and 35 mm. How gray-iron castings are made. (32 — N.C.T.)

Metal of the Ages. Two and one-half reels, 16 mm. Illustrates the activities of the Reading Iron Company. Forty-five minutes. (46 — N.C.T.)

Westinghouse Works. Two reels. Describing the process of an order through the Westinghouse shops. (34 — N.C.T.)

Arc Welding. Lecture and slides, describing the history, method, and equipment used for this type of welding. (34 — N.C.T.)

Electricity in the Steel Industry. Lecture and slides, describing how electricity is used in the modern steel plant. (34 — N.C.T.)

Code

N.C.T. — No charge except for cost of transportation.
F. — Free for one or two copies.
F.O. — Free to teachers; others pay price indicated.

1. Department of Commerce, Bureau of Mines, Pittsburgh, Pa.
2. The Y.M.C.A. Motion Picture Bureau, 347 Madison Ave., New York, N. Y., or 19 S. La Salle St., Chicago, Ill.
26. South Bend Lathe Works, South Bend, Ind.
32. General Electric Company, Visual Instruction Section, 230 S. Clark St., Chicago, Ill.
33. American Steel & Wire Company, 208 S. La Salle St., Chicago, Ill.
34. Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.
39. Aluminum Company of America, Advertising Department, 2400 Oliver Bldg., Pittsburgh, Pa.
40. Greenlee Tool Co., Rockford, Ill.
41. Atlas Educational Film Co., Oak Park, Ill.
42. International Harvester Company, 606 S. Michigan Ave., Chicago, Ill.
43. Douglas D. Rothacker, 729 Seventh Ave., New York, N. Y.
44. Cleveland Twist Drill Co., Cleveland, Ohio.
45. Lincoln Electric Co., 12818 Coit Road, Cleveland, Ohio.
46. Reading Iron Company, 401 No. Broad St., Philadelphia, Pa.
47. Flexible Steel Lacing Co., 4607 Lexington St., Chicago, Ill.
48. Norton Company, Worcester, Mass.
49. Nicholson File Co., Providence, R. I.
50. The L. S. Starrett Company, Athol, Massachusetts.
51. The Skinner Chuck Co., New Britain, Connecticut.
52. The R. K. LeBlond Machine Tool Co., Cincinnati, Ohio.
53. The Fellows Gear Shaper Company, Springfield, Vt.
54. Wheeling Steel Corporation, Wheeling, W. Va.
55. Armstrong Bros. Tool Company, 317 N. Francisco Ave., Chicago, Ill.
56. Gallmeyer & Livingston Co., Grand Rapids, Mich.
57. The Peck, Stow & Wilcox Company, Southington, Conn.

Booklets and Charts

Making Steel and Wire. The manufacture of steel, and the shaping of steel products by hot rolling. (33 — F.)

Short Cuts to Power Transmission. Information about belts, belt lacing, cementing, effect of speed, belt slip, and causes of belt troubles. (33 — F.)

Grinding-Wheel Information. (48 — N.C.T.)

Factors Affecting Grinding-Wheel Selection. (48 — N.C.T.)

Artificial Abrasives, Their History and Development. (48 — N.C.T.)

Character and Uses of Norton Products. (48 — N.C.T.)

Handbook for Drillers. A small textbook on drills and drilling. (49 — F.)

Ready Reference Chart. Loose-leaf pages. Cutting speeds, and feeds, decimal equivalents, tap and drill sizes, etc. (49 — F.)

File Filosophy. The different kinds of files and their uses. A list of terms with definitions used in connection with files and filing. (49 — F.)

File Chart. Wall hanger file chart. (49 — F.)

The Starrett Transit Book. (50 — F.)

Hack Saws and Their Uses. (50 — F.)

How to Run a Lathe — 30th Edition. Instructions for the care and operation of a back-geared screw-cutting engine lathe. (26 — F.)

South Bend Machine Shop Course — No. 55A. A description and price list of the job sheets and material for a machine-shop course. (26 — F.)

Chucks and Their Uses. Explains when certain types of chucks should be used. (51 — F.)

Questions and Answers. Questions and answers about the proper use of chucks. (51 — F.)

The Lathe Book. Tells all about lathe work. (52 — F.)

Operator's Handbook. Instructions and suggestions for cutting gears; gear tables, and information about cutting oils. (53 — F.)

The Involute Gear. A treatise which makes plain the action of involute gearing, and yet avoids the use of higher mathematics. (53 — F.)

The Internal Gear. An analysis of comparative tooth action of internal and external gear teeth. (53 — F.)

The Thread Generator. Information about worm and pinion gears. (53 — F.)

Hourglass Worm-Type Thread Generator. Describes how to generate steering worms for automotive use. (53 — F.)

From Mine to Market. The mining and manufacture of steel. (54 — F.)

Set of Blue Prints. The proper grinding of lathe, planer, and boring tools. (55 — F.)

Tap Grinders. A description of the grinder and the work it will do. (56 — F.)

Drill Grinders. A description of the grinder and the work it will do. (56 — F.)

No. 1½ and No. 2 Universal Cutter and Tool Grinders. A description of the grinder and the work it will do. (56 — F.)

No. 3, No. 4, and No. 5 Universal Cutter and Tool Grinders. A description of the grinder and the work it will do. (56 — F.)

Aluminum Paint — A Metal Pigment Priming Coat — No. 22. The uses of aluminum paint in the home, and in industry, as a primer. (39 — F.)

Screw-Machine Products — No. 62. (39 — F.)

Alcoa Aluminum Die Castings — No. 63. (39 — F.)

Aluminum Casting Alloys — No. 64. (39 — F.)

Machining Aluminum — No. 65. (39 — F.)

The Riveting of Aluminum — No. 66. (39 — F.)

The Welding of Aluminum — No. 67. (39 — F.)

Genuine Puddled Wrought Iron Pipe. Its characteristics, manufacture, and adaptabilities. (46 — F.)

SHEET METAL

Booklets and Charts

Guide 25-A. Information about sheet-metal equipment for schools, and suggestions for the teaching of sheet-metal work. (57 — F.)

Sheet-Metal Machines. A set of wall

charts illustrating and explaining how to use sheet-metal machines. (57 — F.)

Sheet Iron, a Primer. The importance of iron, its early history, the mining and manufacture of iron, and the products into which it is made. (58 — F.)

The Metal Crafts. Published three times between September and June; information about metals and their use in school shops. (59 — 50c)

Circular No. 103–A. Sheet-metal equipment for schools, with floor plans. (60 — F.)

Bulletins No. 74, 75, 76, 77, 78, and 80. Showing machines and tools for the sheet-metal shop; data as to construction, purpose, and utility of the various machines and tools. (60 — F.)

Evolution of a Tin Can. The manufacture of iron and steel, and the making and uses of tin cans. (61 — F.)

Bright Tin Plates. The manufacture of coke and charcoal bright tin plates. (61 — F.)

PRINTING

Films

From Trees to Tribunes — No. C–1375. Three reels, 35 mm. Every phase of paper making. (2 — N.C.T.)

A Day with the Sun — No. 1186, 35 mm.; No. 1686, 16 mm. Three reels. A picture of the newspaper industry. (2 — N.C.T.)

The Voice of Business — No. 1372. Three reels, 35 mm. Paper making from the raw material to the finished product. (2 — N.C.T.)

The World of Paper — No. 42. Two reels, 16 and 35 mm. The development of recording events. (32 — N.C.T.)

Romance of Printing. Six reels, 35 mm. From the scriptorium to the modern printing plant. (41 — N.C.T.)

Booklets and Charts

Printing in the Junior High School. A layout for a printshop and suggested equipment for a junior high school. (62 — F.)

Printing as a Subject in the Schools. A layout for a printshop and objectives of printing in several types of schools. (62 — F.)

Visual Aids for Instruction in Printing. Charts. A set of 24 charts, including proofreaders' marks and how to use them; how the troublesome letters, b, d, p, and q look in the type stick, etc. (62 — $2.00)

Printing Education. A directory of teachers and administrators. (63 — F.)

The Story of Paper Making. The history of paper making. (64 — F.)

WOODWORKING

Films

Conquest of the Forest — No. 33. One reel, 16 and 35 mm. The lumber industry of the great northwest. (32 — N.C.T.)

Doings of Turp and Tine — No. 1322. One reel, 35 mm. Production of gum and steam-distilled turpentine. (2 — N.C.T.)

The Manufacture of Wire Products — No. 1116, 35 mm.; No. 1658, 16 mm. One reel, 16 and 35 mm. Drawing wire, making nails, fence, barbed wire, and wire rope. (2 — N.C.T.)

Harvesting Uncle Sam's Timber. Two reels, 35 mm. Disposal of mature timber in the National Forests. (65 — N.C.T.)

Winter Logging in the White Mountains. One reel, 35 mm. How lumberjacks live and work. (65 — N.C.T.)

Lumbering Pine. One reel, 35 mm. How government timber is cut. (65 — N.C.T.)

Pines, From Seed to Sawmill. Two reels, 35 mm. The importance of reforestation. (65 — N.C.T.)

Code

N.C.T. — No charge except for cost of transportation.
F. — Free for one or two copies.
F.O. — Free to teachers; others pay price indicated.

1. Department of Commerce, Bureau of Mines, Pittsburgh, Pa.
2. The Y.M.C.A. Motion Picture Bureau, 347 Madison Ave., New York, N. Y., or 19 S. La Salle St., Chicago, Ill.
19. Clover Manufacturing Co., Norwalk, Connecticut.
32. General Electric Company, Visual Instruction Section, 230 S. Clark St., Chicago, Ill.
41. Atlas Educational Film Co., Oak Park, Ill.
59. Metal Crafts Supply Co., 37 Aborn St., Providence, R. I.
60. Niagara Machine & Tool Works, Buffalo, N. Y.
61. American Sheet and Tin Plate Company, Frick Bldg., Pittsburgh, Pa.
62. American Type Founders Company, 300 Communipaw Ave., Jersey City, N. J.
63. United Typothetæ of America, 14th & K Sts., N.W., Washington, D. C.
64. Kalamazoo Vegetable Parchment Co., Parchment, Mich.
65. U. S. Department of Agriculture, Forest Service, Washington, D. C.
66. E. C. Atkins and Company, Indianapolis, Ind.
67. Klise Manufacturing Co., Inc., Grand Rapids, Mich.
68. American Chime Clock Co., 1669 Ruffner St., Philadelphia, Pa.
69. The Stanley Rule and Level Plant, New Britain, Conn.
70. The National Committee on Wood Utilization, U. S. Department of Commerce, Washington, D. C.
71. Yates-American Machine Company, Beloit, Wis.
72. Northwestern Lumbermen's Association, 1645 Hennepin Ave., Minneapolis, Minn.
73. Hardwood Manufacturers Institute, Memphis, Tenn.
74. American Walnut Manufacturers' Association, 616 S. Michigan Ave., Chicago, Ill.
75. Superintendent of Documents, Government Printing Office, Washington, D. C.
76. Northern Hemlock and Hardwood Manufacturers Association and Rotary Birch Club, Oshkosh, Wis.
77. Forest Products Laboratory, U. S. Department of Agriculture, Madison, Wis.
78. J. H. Monteath Co., 202 Lewis St., New York, N. Y.
79. Indiana Quartered Oak Co., East Ave. and 12th St., Long Island City, N. Y.
80. Hartley Akin Lumber Co., Cincinnati, Ohio.
81. Minnesota Mining & Manufacturing Co., St. Paul, Minn.
82. Southern Oak Flooring Industries, Boyle Bldg., Little Rock, Ark.
83. The Malleable Iron Fittings Co., Branford, Conn.
84. American Screw Co., Providence, R. I.
85. The David Maydole Hammer Company, Norwich, N. Y.
86. California Redwood Association, 405 Montgomery St., San Francisco, California.
87. American Lumberman, Inc., 431 S. Dearborn St., Chicago, Ill.

Dual-Purpose Trees. One reel, 35 mm. The naval-stores industry of the South. (65 — N.C.T.)

Wood Wisdom. One reel, 35 mm. The different qualities of hard wood and soft wood. (65 — N.C.T.)

The Meteor. Two reels, 16 and 35 mm. The story of the crosscut saw. (66 — N.C.T.)

The Serpent's Tooth. One reel, 16 and 35 mm. The story of the hand saw. (66 — N.C.T.)

Treating the Tall Timbers — No. 1201. One reel, 35 mm. The operation required to convert the giants of the forest into useful articles. (2 — N.C.T.)

Manufactured Abrasives — No. 76. Three reels, 16 and 35 mm. Development and method of manufacturing artificial abrasives. (1 — N.C.T.)

From Pigs to Paint — No. 1028, 35 mm.; No. 1628, 16 mm. Two reels, 16 and 35 mm. The story of Dutch Boy white lead. (2 — N.C.T.)

Booklets

Book of Projects. Plans for various projects. (67 — F.O.$1)

Clocks. Plans for various clocks. (68 — F.)

Stanley Plans. Plans for various projects. (68 — 10c each)

You Can Make It. Plans for uses of second-hand boxes and odd pieces of lumber. (70 — 10c)

Construction of a Teacher's Flat-Top Desk. Booklet giving detailed information on the construction of a teacher's desk. (71 — F.))

What to Make with Wood and How. A folder showing things that can be made by junior-high-School boys. (72 — 3c)

The Charm of the Sovereign Wood. Information about oak; its use, characteristics, and how to finish. (73 — F.)

The Story of the American Walnut. Walnut, its uses and how it is finished. Pictures of furniture of the Italian Renaissance period. (74 — F.)

The Gluing of Wood — Department Bulletin No. 1500. Information about glues used in woodworking, and correcting gluing defects. (75 — 25c)

The Identification of Furniture Woods — Misc. Circular No. 66. Description of woods commonly used for the exposed parts of furniture. (75 — 25c)

Kiln Drying Handbook — Department Bulletin No. 1136. General principles of drying wood. (75 — 30c)

Beautiful Birch for Beautiful Woodwork. The use of birch for furniture and interior work. (76 — F.)

Hard Maple in the Industries. Facts for quick reference. (76 — F.)

Maple Furniture of Yesterday and Today. Illustrations of rooms furnished with maple furniture. (76 — F.)

Seven Vital Factors of Building Construction. (76 — F.)

Technical Notes on Wood Structure. (77 — F.)

The Story of Balsa Wood. (78 — F.)

Tropical Lumber for Industrial Arts and Vocational Work. Philippine mahogany for manual training and boat building. Suggestions for finishing Philippine mahogany. (79 — F.)

Cedar Chests. Photographs of cedar-chest and red-cedar lumber. (80 — F.)

Paper and Cloth Abrasives. Information about the manufacture and use of various kinds of sandpaper. (81 — F.)

Coated Abrasive Materials. Sand and garnet paper, what it is, how it is made, and how it is used. (19 — F.)

How to Lay and Finish Soft Oak Floors. How to handle, lay, scrape, finish, and wax oak flooring. (82 — F.)

Nail Knowledge. Nails and how they are manufactured. (83 — F.)

Wood Screws. The development and manufacture of wood screws. (84 — F.)

A Captain of Industry. The story of David Maydole, inventor of the adz-eye hammer; shows the different varieties of hammers; gives useful information for mechanics. (85 — F.)

California Redwood. The properties and uses of gumwood and comparison of redwood with other woods. (86 — F.)

Touch Wood. A tale of the trees and their uses. (87 — 15c)

Education Through Woodworking. Essays on cabinetmaking as a cultural subject. (71 — F.)

Chats on Period Styles in Furniture. One booklet on the Adam Brothers style, and one on the Duncan Phyfe style. (71 — F.)

Course in Woodwork for Junior High Schools. (30 — 25c)

Tools and Machines

Yankee Tool Book. Illustrations of uses of tools. (88 — F.)

Clamps. Illustrates the various clamps for woodworking. (89 — F.)

Disston Saw Tool and File Manual. The difference in shape of teeth on different kinds of saws. (90 — F.)

The Saw in History. A comprehensive description of the development of the saw from the earliest times down to the present day. (90 — F.)

Saw Sense. The manufacture, use, and care of hand saws. (66 — F.)

Text Book of Saws. The care and use of saws, written especially for the school shop. (66 — F.)

Abrasives in the Service of Industry. The manufacture of grinding and sharpening stones. (91 — F.)

Safety Code for the Use, Care, and Protection of Abrasive Wheels. The speeds, precautions, and care and use of grinding wheels. (92 — F.)

Grinding Wheels. Separate leaflets on Cylindrical Grinding Wheels; Internal Grinding Wheels; Snagging Wheels; Abrasive Wheels, Grind, Carboloy, Widia; Tool and Cutter Grinding; Surface Grinding Wheels; Abrasive Grinding Wheels for Machine Shops and Garages; Keep Tools Sharp, It Pays; For Sharper Saws and Knives; For Keen Edges Use Sharpening Stones; Abrasive Rubbing Bricks. (92—F.)

Advice on How to Sharpen Woodworking Tools. How to sharpen plane irons, gouges, knives, hatchets, scrapers, bits, and planer knives. (91 — F.)

Proper Installation and Care of Band Saws. List of things to avoid in using a band saw. (93 — F.O.10c)

Installation, Care, and Operation of Circular Saw Benches. Devoted to installation, nomenclature, saw blades, safety rules, and operations. (93 — F.O.15c)

The Crosscut Saw. The manufacture, use, sharpening, and care of crosscut saws. (94 — F.)

The Circular Saw. Care and use of circular saws, and a brief history of the circular saw. (94 — F.)

Hacksawology. Helpful hints for using hack saws. (94 — F.)

File Facts. The different kinds of files and their uses. (94 — F.)

How to Sharpen. Proper methods of sharpening tools. (95 — F.)

Stanley 45 Plane. Directions for using a combination plane. (69 — F.)

Stanley 55 Plane. How to use the Stanley molding and beading plane. (69 — F.)

How to Use Handscrews. The correct use and care of hand screws. (96 — F.O. 10c)

The Making of an Auger Bit. An illustrated talk on how auger bits are made. (40 — F.)

Tools for Carpenter, Electrician, and Plumber. (40 — F.)

Finishing Materials

The Story of Shellac. The uses and importance of shellac, and how shellac is prepared for the market. (97 — F.)

Code

N.C.T. — No charge except for cost of transportation.
F. — Free for one or two copies.
F.O. — Free to teachers; others pay price indicated.

30. Division of Industrial Education, State Teachers College, Santa Barbara, California.
35. Driver-Harris Company, Harrison, N. J.
39. Aluminum Company of America, Advertising Department, 2400 Oliver Bldg., Pittsburgh, Pa.
40. Greenlee Tool Co., Rockford, Ill.
41. Atlas Educational Film Co., Oak Park, Ill.
66. E. C. Atkins and Company, Indianapolis, Ind.
67. Klise Manufacturing Co., Inc., Grand Rapids, Mich.
69. The Stanley Rule and Level Plant, New Britain, Conn.
71. Yates-American Machine Company, Beloit, Wis.
88. North Bros. Mfg. Co., Philadelphia, Pennsylvania.
89. Hartford Clamp Co., Burnside, Conn.
90. Henry Disston & Sons, Inc., Philadelphia, Pa.
91. The Carborundum Company, Niagara Falls, N. Y.
92. Abrasive Company, Tacony and Fraley Sts., Philadelphia, Pa.
93. Oliver Machinery Co., Grand Rapids, Michigan.
94. Simonds Saw Co., Fitchburg, Mass.
95. Pike Manufacturing Co., Pike, N. H.
96. Adjustable Clamp Co., 417 N. Ashland Ave., Chicago, Ill.
97. William Zinsser & Co., 516 West 59th St., New York, N. Y.
98. National Lead Company, 111 Broadway, New York, N. Y.
99. The Sherwin-Williams Co., 601 Canal Road, N.W., Cleveland, Ohio.
100. Boston Varnish Co., Everett Station, Boston, Mass.
101. The DeVilbiss Company, Toledo, Ohio.
102. Kellogg Manufacturing Co., Rochester, N. Y.
103. S. C. Johnson & Son, Inc., Racine, Wisconsin.
104. The Wooster Brush Company, Wooster, Ohio.
105. The Egyptian Lacquer Manufacturing Company, Inc., 90 West St., New York, N. Y.
106. E. I. du Pont de Nemours & Company, Parlin, N. J.
107. Eastman Kodak Company, Rochester, N. Y.

Shellac and Its Uses. The proper use of shellac in finishing. (97 — F.)

Handbook on Painting. Complete directions and formulas for painting wood, plaster, wall board, masonry, and metal. (98 — F.)

The Joy of Color. Color schemes for rooms in a home. (99 — F.)

Tasteful Interiors. Color schemes for all rooms of a house. (100 — F.)

Portable Spray-Painting Equipment. Information about the care and operation of spray gun in painting. (101 — F.)

Modern Finishing Methods. The care and operation of spray-painting equipment. (102 — F.)

Kellogg Compressors. Air compressors, paint-spraying equipment, and air-operated equipment. (102 — F.)

Spray Painting. The answer to the question. (102 — F.)

Aluminum Paint, Its Uses, Utility and Application — No. 20. The properties and uses of Alcoa Albron Bronze Powder for aluminum paint. (39 — F.)

Aluminum Paint in the Protection of Wood — No. 21. Evaluating the results of studies on aluminum paint as a wood protector. (39 — F.)

Text Book on Wood Finishing. The definition, description, and how to apply the different types of finishes for wood. (103 — F.)

Helpful Hints on the Use and Care of Paint Brushes. (104 — F.)

Wooster Brush Service Manual. Proper application of all kinds of painting material, correct brush to use, etc. (104 — 10c)

The Manufacture of Good Paint and Varnish Brushes. (104 — F.)

Color Mixing and Matching for Automobiles. Information about mixing and matching colors in lacquer. (105 — F.)

Charts

Four Wall Charts of Machines. Circular saw, turning lathe, scroll band saw, heads and knives. (71 — F.)

Machine-Cut Molding. A bag of sample moldings. (67 — F.)

Nails. Large wall chart showing all of the different kinds of nails. (33 — F.)

Wall Charts of Machines. Charts show lathe, saw bench, etc., with sections. Names of the main parts are shown. (93 — F.)

Stanley Charts and Tracing Sheets. The charts are 18 by 14 in.; the tracings, 8 by 10½ in. The set consists of 20 charts describing the 1-ft. rule, how to use the try-square, how to use the doweling jig, etc. This material is also available printed on white paper in the notebook size, 8 by 10½ in. (69 — F.)

Disston Hack Saw Chart. How to use blades in hand frame. (90 — F.)

File Chart. (90 — F.)

Hand-Saw Chart for Crosscutting. (90 — F.)

Duco Educational Displays. Consists of six small bottles filled with materials showing how Duco is manufactured. (106 — F.)

MISCELLANEOUS

Picture Taking at Night. Flashlight pictures, photoflash lamp, etc. (107 — F.)

Developing and Printing with the Eastman 3A or the ABC Outfit. (107 — F.)

The Velox Book. The working of a simple paper told in simple terms. (107 — F.)

Development with the Kodak Film Tank. Also directions for printing on Velox paper. (107 — F.)

At Home with the Kodak. Taking pictures in the home. (107 — F.)

Outdoor Exposure Guide. How to take different kinds of outdoor pictures. (107 — F.)

The Home of Kodak. Facts about the world's largest photographic organization. (107 — F.)

BUY CHRISTMAS SEALS AND HELP VANQUISH TUBERCULOSIS

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

J. J. Metz, Editor

PROFITING FROM PRESENT CONDITIONS

According to reports from the Federal Offices of Education, thousands of high-school graduates are anxiously awaiting their opportunity to go to work. Under present conditions, unfortunately, their desire for jobs cannot materialize. In the meantime, what shall be done with these young people to keep up their morale?

Many high-school principals have realized their opportunities, and recognizing the value of the plea made by the President's Committee on Unemployment Relief, have made it possible for high-school graduates to return for further study. Naturally, this means changes in the high-school program. It means more work for faculties which, in only too many cases due to mistaken ideas of economy, are undermanned, or underpaid, or both.

Nevertheless, the situation is a challenge to every schoolman engaged in secondary education. Some high-school principals have already opened classes in which university extension work is offered. This probably is as good a method as any so far proposed. One instructor, with the proper educational background, can assist a large number of pupils in a class devoted to this type of work. It is a problem of real individual instruction. The pupil can choose any extension university, or practical course that he may wish, and then attend a class where he is sure of getting assistance when he needs it. He also is in surroundings where he can concentrate on his schoolwork without being distracted by the usual noises and activities found in the home. This method of extending a high-school education ought to be of special interest to the teachers of industrial arts and vocational education. So many of the extension courses offered by our state universities and by the better types of correspondence schools lend themselves readily to the industrial type of work. Thus the student who has specialized in mechanical or architectural drawing can extend his knowledge by taking advanced mathematics, strength of materials, statics, machine design, sketching, kinematics, and subjects of this kind. The boy from the machine shop can take up toolmaking, tool design, and advanced mathematics. The printer can enlarge his acquaintance with English, especially the application of the mechanics of grammar.

Others, who may not yet have found themselves, may by a study of some of the engineering branches at least widen their horizon. At any rate, many high-school graduates, if this opportunity is offered to them, will be able to acquire a background of mathematics, related-subjects material, and science that will put them to the forefront when the choosing of workers to fill responsible places once more becomes the regular rather than the exceptional thing.

In many schools this system already has been inaugurated. It deserves to be spread still more, thus opening up the idea and the opportunity of university work to thousands who would otherwise not have availed themselves of the educational advantages offered by institutions of higher learning.

—◎—

A REAL OPPORTUNITY

Kansas City, Missouri, "The Gateway of the West," is beckoning to all those interested in industrial-arts and vocational education. The American Vocational Association Convention, to be held at that city, December 7–10, gives teachers, supervisors, and directors of industrial arts and vocational education throughout the country an opportunity to discuss the problems which existing economic conditions have imposed upon this type of education. To make the coming convention a real success, then, requires that all those whose interests lie in the fields of industrial arts and vocational education attend so that they may lend their experience and their knowledge to the solution of the problems which have arisen.

It is true, economies made necessary by reductions in salaries and shortening of teacher time may prompt individuals to forego the pleasure and the benefits which might accrue due to attendance at the convention. It must not be forgotten, however, that both the industrial-arts and vocational-education men are confronted by issues which clamor for attention and solution. Not only must those interested in industrial arts and vocational education strive to put their own house in order, but they must also help to fortify, strengthen, and enlighten the many educational leaders whose academic rearing and training has never allowed them to fully realize the value of the more practical educational endeavors.

Many superintendents, board members, and principals have no real conception of the necessity and value of including industrial arts and vocational education in the school curriculum. Many of them are still too prone to classify both of these types of education as special subjects which can be thrown overboard just as soon as the winds of adversity blow a little stronger than usual.

Industrial-arts teachers should read elsewhere in this issue what a fine progressive program the representatives of their field have set up for the coming convention. This program committee has worked hard to get the American Vocational Association to give more recognition to the work done by the industrial-arts

teacher the country over. According to all indications, this recognition will be at last accorded, and there is every hope that henceforth industrial-arts workers will have the same status in the A.V.A. as the different vocational groups now have. This means that industrial-arts men will have an organization that is national in intent and scope. It is needless to enumerate the advantages accruing from such a representation.

Those who are working for the materialization of this project have labored hard and consistently to make the A.V.A. leaders cognizant of what industrial-arts education offers to the general field of education and also of the close relationship which exists between industrial arts and vocational education. Their work at the A.V.A. conventions has been of unusually high caliber, and if at the coming convention a vice-presidency representing the industrial arts is established, it will be entirely due to the efforts of these leaders. To help them make A.V.A. leaders fully alive to the need of thus recognizing industrial arts, every elementary, junior-high-school, and senior-high-school shop teacher ought to attend.

Besides the industrial-arts program, there is an exceedingly fine and full offering for the vocational teacher. Since the preponderance of the program offerings in the past always have been for the vocational-education men, this part of the program does not need any more mention.

Probably the only feature about which little is heard but which is of great value nevertheless, has to do with the commercial exhibits. These are brought to the convention at considerable cost to the exhibitors. They offer a real service to the visiting teachers. In no other way can the teacher, the supervisor, or the director see so much of the material and equipment needed in his work with so little effort.

Then too, Kansas City, with its diverse industries and its excellent school system is worthy of study. Mr. O. H. Day, director of vocational education in Kansas City, describes graphically, elsewhere in this issue, just what is in store for the convention visitor this year.

The A.V.A. convention, therefore, presents opportunities which ought not be sacrificed for any but the weightiest reasons. Economic conditions, professional growth, the future of industrial arts and vocational education all demand that every shop teacher should help make this coming convention a real success.

Therefore — on to Kansas City!

—◎—

GROWTH FROM WITHIN

The charge has been frequently made that industrial-arts teachers are unprogressive, that they teach their classes without being much concerned about professional improvement.

Lack of ambition may be found among members of all callings. But the opposite may also be found, and it is exceedingly encouraging that there are in existence organizations of industrial-arts teachers who are earnestly striving to advance themselves and their profession.

A perusal of industrial-arts programs held in the past months in many states shows that there is a very healthy tendency for industrial-arts men to take quite an active part in improving their own work. In several instances, state groups of teachers who were not quite satisfied with the progress of their work have voluntarily banded together, appointed committees, and are now hard at work building up comprehensive analyses of their work and in other ways organizing the material which they teach in such a manner that the school-shop subjects can function much more effectively as integral parts of general education.

Some of this improvement, as a matter of fact most of it, is due to the energy, enthusiasm, and far-sighted leadership of city and state supervisors and directors of industrial arts and vocational education. Many of these men — most of them — are real leaders. Nevertheless, in a number of cases, the incentive to improve the work has come from the classroom teacher who had to work under great difficulties to get the movement started and accepted by his fellows.

In one case, an industrial-arts-teachers group at a state teachers meeting, displayed the progressiveness of studying not only how to upgrade their work but also to scrutinize the relationship of the standards they were striving for in the light of the philosophy of education as set up in their state. It is questionable if the teachers of many of the regularly accepted subjects have ever applied this scrutiny to their own work. Yet it is only too common to look upon the shop teacher as being less professional than their brothers in the other branches.

An incentive to improve the work, coming from within, rather than being imposed from above and without, is worth a great deal, and any state that has such a progressive group of industrial-arts teachers has every reason to be proud of it, and surely need not fear to extend to it all of the opportunities and aids that will allow it to function effectively and successfully.

Of course, improvement of this kind always entails work. It is no easy task to make all of the required analyses and studies for the various industrial-arts branches. One of the best ways to accomplish it successfully is by the committee method, each subject being handled by a different group of teachers interested in that particular subject. It is here that coöperation spells either failure or success for part or whole of the venture. Every industrial-arts teacher, who is really interested in his calling should take an interest in this work and actively participate to improve the standing of his profession. The undertaking is too large for just a few. All must participate.

Psychology Involved in Teaching Auto Mechanics

*Stephen Henry Hurtuk**

THERE are a great many readers who believe that psychological tests constitute the only contribution that psychology has to make to the field of industrial and vocational education. Because of their popularity, psychological tests are familiar to practically every educator; as a matter of fact, they are but one psychological instrument for use in the vocational and industrial field. Psychology, however, has made other important contributions which are just as applicable in this field as the psychological tests.

Let us select from the very wide field of psychology these two expressions: *attention* and *interest*, and consider their significance with regard to the subject of auto mechanics, and certain fundamental conditions under which students learn best.

The degree of attention given to the activity determines the success of all teaching. Attention may be easily secured but teachers frequently fail to hold this attention and develop it into interest. Pupils will instinctively and automatically pay attention to moving objects, curious noises, etc. Another most effective way of securing attention in the shop is to demand speed. The teacher should take advantage of these tendencies to secure attention and then lead the pupils into interest. It should be a very simple matter for the auto-mechanics teacher, handling as he does equipment which holds a natural interest for boys, to arrange his work so that he will have the immediate attention of his group. If the teacher develops enjoyment in the work, a habit of attention will result which is given freely by the pupils. This type of attention is to be desired, and leads directly to interest. In all shopwork the instructor must guard against fatigue. The pupil cannot pay attention if he is overtired. When the pupil reaches the point in fatigue where he cannot give undivided attention to his work, or when he is unsteady in muscular control, he should rest. Intensive work periods with frequent rests give better results in setting up good work habits than long periods of leisurely indifference.

One of the most common faults met with in the classroom is a lack of interest on the part of the pupils. It is easy to tell which pupils are interested by the extent to which they identify themselves with their work and the evident feeling of pleasure they have in doing it. This concentration of attention, combined with a feeling of pleasure, gives greater efficiency to the worker. The instructor must consciously work for interest. A pupil cannot be taught new ideas unless he wishes to learn. Interest in the thing being studied makes it more easily learned, retained, and recalled. To hold the pupils' interest the instructor should maintain an atmosphere of deep interest in the work himself. He should know and be able to do well the work he is attempting to teach, as well as the fundamental principles of teaching shop subjects.

Interest may be transferred from something already interesting to something which appears to be uninteresting if the instructor will provide for the pupil a real situation of experience, an activity in which he is interested for its own sake. Plan to develop within a problem a situation that will be an incentive to thought and a reason for action. Be sure that the problem is reasonably within the student's ability and that he possesses the necessary information to solve it. Give him opportunity to test several possible solutions and discover the true one.

In order to arouse interest in a subject, the instructor should follow these two psychological principles: give information, and arouse activity.

Besides the usual information relating to the subject which should be made as interesting as possible, the pupil should be given interesting correlated information. How much greater will be the pupil's interest in grinding valves if he is also taught some related science — why valves are necessary, their construction, the tensile strength of the metal used in making different types of valves, advantages and disadvantages of different types, reason for valve clearance, and the relation of the valve action to that of the crankshaft. He also should be taught some related mathematics, related drawing, study of materials from which valves are constructed, terminology pertaining to valves, necessary precautions and safety in working with valves. Auto mechanics is particularly rich in correlated materials which will do much to arouse interest in almost any phase of the subject under consideration.

The second psychological means of arousing interest in a subject is to arouse activity in it. When the instructor finds a student seeming to lack interest he should be given some particular responsibility such as being a foreman over a group on a job. Make him responsible for the completion and the quality of a given piece of work. The instructor might arouse pride in the shop and the work by allowing some seemingly uninterested pupil to conduct visitors through the shop, explaining equipment, etc. Some pupils show a

*Collinwood High School, Cleveland, Ohio.

greater interest if appointed as helper to the instructor. Another aid to interest through activity is the keeping of a progress chart. By means of this chart the student can tell at a glance his standing with reference to the class. This gives him incentive to speed up his work. Development of short objective tests serves as an incentive to acquire information about the subject.

Instructional material must be selected with reference to the pupil's past experience and ability in order that he may be interested and that some degree of success will meet his efforts in his new experiences. The selection of instructional material should be made so that the pupil will know definitely what he is expected to learn. In order to do this, units of instruction must be selected which constitute steps necessary to do a given job.

It is generally agreed among teachers that skill is necessary to impart instruction, but they often overlook the necessity of understanding the pupil as a means of acquiring success in teaching, and a knowledge in a scientific way of the psychological laws and principles of teaching.

To sum up: The instructor should work for and get the attention of the pupil, develop this attention into interest, continuing until action results. He should then guide this action toward the achieving of desired results and by drill and repetition develop proper habits and skills.

Current Comment No. 7

Variety in Class Conduct

*Homer J. Smith**

IT WAS Cowper who admonished, "Variety's the very spice of life, that gives it all its flavor." He probably had in mind the diversity and mixture that lend quality to art, music, and reading. Certainly, he did not fail to make reference to the environment, the work life, and the recreation of the people. He meant to advise that in every aspect of existence and experience we might beeome more content and make greater progress through the introduction of difference and multiplicity. He counseled that change and power go hand in hand.

The purpose of this writing is to particularize these truths with respect to our daily shop and classroom contacts with growing, learning youth. There is the strong feeling or fear that the routine of our teaching and management has become too well established. We are probably discounting our results by attempting too closely to define our procedure. We may be permitting our daily or period doings to become too standardized.

It is pleasant for those of us who have closed our formal schooling to look back across the years and to revel in memories of persons and events. It would be profitable for those of us who now instruct to attempt to characterize the small group of teachers who served us best and who really pleased and enthused. In my own case it was the teachers who were versatile in attack, to whose classes we youngsters went without sureness of what would happen, from whom we trooped with satisfaction borne of the breaking of monotony. Those who had only one method, who exacted a uniform response, who advanced by rule-of-thumb, and who would not be distracted or diverted have been almost forgotten. The adaptable, casual, yet purposeful ones are remembered and revered. They taught us most, lead us easiest, and pushed us farthest. They are most entitled to respectful memory.

The present emphasis, in industry teaching, upon individual instruction and upon the use of written, directive materials has greatly strengthened our content. We are improving our courses but, probably, at the same time, experiencing a slump in method. It is admitted that the recording of well-selected and highly systematized units of instruction is a thing of consequence. Not only are these the foundation of our work but they beget pride and confidence in the minds of instructors. It is a boon as well as a bulwark to know that analysis and organization and ordered lesson sheets have made for readiness. But, these spell only readiness; the real task remains.

This preliminary work gratifies the teacher and his superiors but it engenders no like enthusiasm among students. Practically all students have greater interest in what is going to be done. They wait to see what the teacher has in store in the way of approaches and checks. They are sensitive to good method and management, resenting their absence. They could not so express it, but they know that two teachers with equal material readiness can be widely unlike in the efficiency of presentation. With one of these teachers, they will learn and be happy while at it as well as in consequence of it. With the other, they will be bored by the process as much as by the lack of gain. *Good method is even more important than good content, and variety in class conduct is the essence of good method.*

Some teachers employ the same means with every subject, phase, class, and boy with which they deal. Their plans and actions are the same for every day and period. One would expect them to fish in any water and at any time of day with the same bait, depth, and

*Professor of Industrial Education, University of Minnesota, Minneapolis, Minnesota.

action but they know better than that. They are not content, *in their fishing*, to work without matching of method and aim and to take what they chance to get. They want to be happy on the way home and when they meet their discerning friends. Those who teach by a single method should have their stories and their strings of catch well examined. The results which they get, or assume that they get, in the classroom should be subject to criticism by those who know. Such teachers should be served strong and unrelenting notice that good teaching must be done most of the time rather than upon scattered occasions when a given attack may chance to suffice. Those not naturally gifted in presentation and who show little initiative and ingenuity should be led into variety. It is only variety that will cure them of their ills. Cases where such patients have responded splendidly to treatment are so numerous as to be heartening. Convalescence and full recovery make them everlastingly grateful.

It seems to have been established that subjects and phases differ, that classes present a changing degree of acceptance, that individuals study in numerous ways and are not always like themselves, and that classroom learning conditions are far from constant. Is there fairness, faced with this situation, in a teacher's reliance upon one method or one technique in the handling of his work? Is there not plain justice in the claim that variety should be forced upon a teacher if it does not come by nature, by training, or through professional desire?

The good instructor should know how to use written instructional materials for both group and individual teaching. He should know how to make use of the textbook plan, how to lecture, and how to demonstrate. The old-fashioned question-and-answer recitation should not be entirely outside his abilities. He should know how to deal with a whole class, or a part of it, or one lone member of it and all to good effect. He should know how to assign library reference or homework, not omitting their complement of suggestions as to just how to proceed. He should know how to control coöperative endeavors, when to be leader and when to observe attentively and to keep out of the picture. In short, he should be skillful in several types of presentation — in several means of offering new material and in controlling the student activity required for its getting and retention.

Likewise, the good teacher should make earnest attempt to break the very natural tendency to "carry-on" in the routine and accustomed way. There is no law or rule to the effect that boys should enter a shop or drafting room and go immediately to work. There ought to be a rule that they invariably seat themselves before the instructor to learn what he may have planned in new or different procedure. Boys should not approach a class period with the feeling that the hour is theirs for the advancement of their projects and jobs. Rather than to look askance at the instructor when he claims a measure of the time, they should gather at the bell-stroke in anticipation of something different and in wonder as to what it will be. *What so deadening as the certainty of events! What so opposed to our knowledge of learning as the dead-set management scheme!*

Why not have something to show our students? Why not make content from some current event? What have we read which should interest them? Has one of of them something to report? Has the blackboard served its purpose? Are there tools and materials to be checked in and passed to their places? What about the new book or the trade journal just received? Has some boy brought his "collection" or a unique piece from his home? Has some great laboratory announced a new material that may revolutionize the world of industry and commerce? Is some visitor at hand with a word of interest for the group? Would they not prefer to read today or to leave the shop for some good purpose?

Perhaps the project just completed needs discussion. Perhaps there would be gain in calling the roll by names of tools, by kinds of fastenings, by books, or by phases of drawing. Maybe the boys would discuss the improvement of plans for the care of supplies and equipment. Maybe they would warm up to the making of a new design. They would scarcely decry an opportunity to watch their teacher work, or to help organize a test, or to learn how grades are arrived at. You say they are there to work? Some of us deny it! We say they are there to learn and that manipulative work will not insure a proper return on the space and time and money allotted. Interest must be created and maintained; information must be passed that will later be used; some skill must be developed that probably will not be called for.

The purport of this writing is not that information is more important than practice and product. That is generally conceded in these days and is fundamental to this discussion. These brief lines are a plea for improvement in the use of class time in keeping with what we know of the learning abilities and necessities of students. *Variety* is the catchword and the thing to be kept in mind. *Variety* is a virtue in the classroom as elsewhere. *"Variety's the very spice of life, that gives it all its flavor."*

TITLE PAGE AND INDEX FOR VOLUME 21 NOW AVAILABLE

A title page and index for Volume 21 of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION has been prepared for the readers who bind their magazines. A card addressed to the publishers at 524–544 N. Milwaukee St., Milwaukee, Wis., will bring a copy.

Cooperating With the Scouts

*Lee M. Klinefelter**

THE use of life interests and everyday activities in schoolwork is generally approved, at least in theory, by all modern educators, but the actual putting into practice of this principle is not always easy.

In the general shop the situation is particularly favorable, since the work may legitimately cover a wide range of activities. The general shop, being more generally found in the junior high schools, deals with boys at an age when their interests, likes, and dislikes are all very strong. They enter whole-heartedly into that which interests them, and just as actively avoid that which does not. Many of these boys belong to the Boy Scouts, which fact is likely to swing their interests to some of the crafts.

The Boy Scouts' organization has a broad program of craftwork. Scout promotion and advancement depend largely on the acquisition of merit badges for excellence in various activities. The incentive that this gives to shopwork may well be used by the teacher and so directed as to be of actual value.

Among the arts and crafts for which merit badges are given, and some phases of which are not out of place in the general shop, are archery, art, architecture, automobiling, aviation, basketry, blacksmithing, bookbinding, carpentry, cement, electricity, farm home and planning, farm layout and building arrangement, farm mechanics, first aid, foundry practice, handicraft, leather craft, leather work, machinery, masonry, metal, painting, photography, plumbing, pottery, printing, radio, taxidermy, textiles, wood carving, and woodwork. On each of these subjects a pamphlet is printed containing much useful information as well as the requirements for the merit badge. These pamphlets are supplied by scout executives or at national headquarters at 20 cents each.

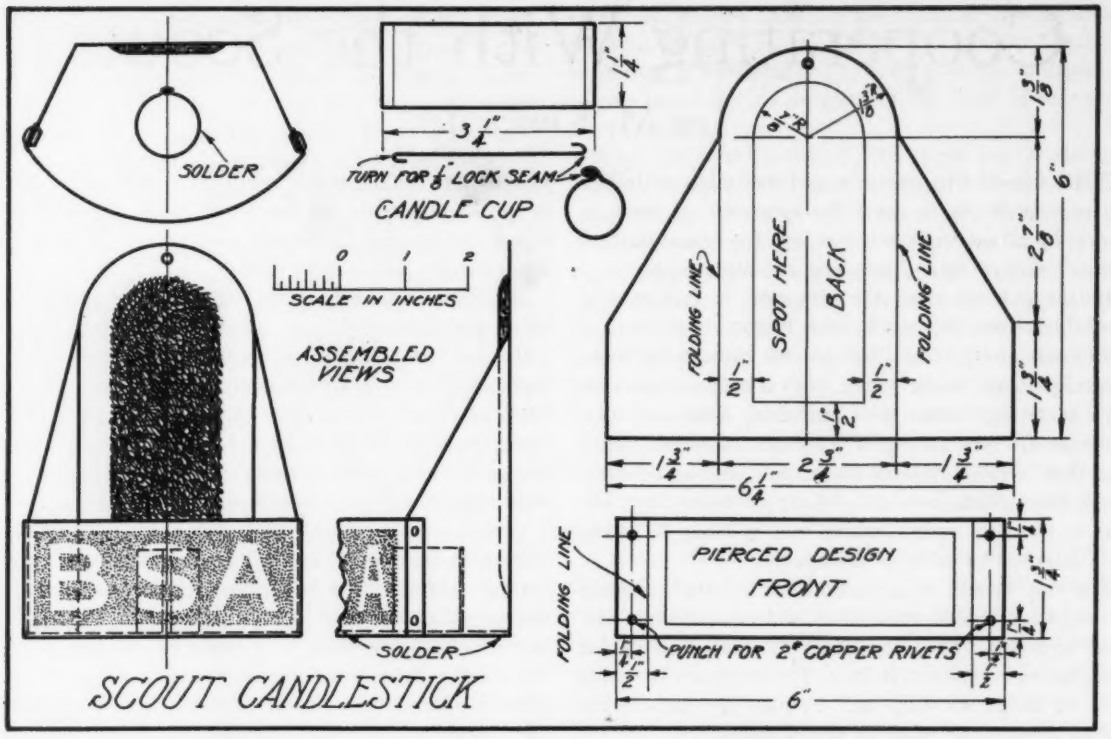
Of course, it would be impossible for any teacher to be an authority of all the subjects listed in the foregoing, but he should be an authority on one or two of them and be able to help an aspiring scout in the study of almost any of them. A copy of the pamphlets most likely to be used should be kept in the shop library and will prove a valuable reference library, as well as a considerable source of shop problems.

Personal acquaintance with the local scout executive or scout master, and with the examiners in the various crafts will be of assistance in furthering the interest of the boys. It should be borne in mind that in most cases the primary interest of the boy is not the subject being studied but the acquisition of the merit badge in the easiest and quickest way. This being the case, a certain amount of diplomacy may sometimes arouse a real interest in the subject itself. This interest, once aroused, may hold over after the merit badge has been acquired.

To illustrate the possibilities: The writer undertook to bind in the shop several volumes of *National Geographic Magazines* for the school library. The sight of this work being done brought a number of requests from boys who wished to get the Scout merit badge for bookbinding. Several of the boys were allowed to do so, some binding the *Geographics* for the school library, one bringing magazines from home to bind, another bringing a dictionary to rebind, and a few

*Ruffner Junior High School, Norfolk, Virginia.

LEFT: SCOUT CANDLESTICK. RIGHT: SCOUTS BINDING BOOKS FOR BOOKBINDING MERIT BADGE



Directions

1. Make all parts of 18-oz. soft copper.
2. Make the design which is to be pierced on the front.
3. Tack the front on a piece of soft wood and outline the design with pierced holes.
4. Shape the front, using a wood mallet so as not to close up the pierced holes.
5. Stipple in the design shown on the back.
6. Raise the stipple part lightly as shown.
7. Cut out the bottom to fit.
8. Solder candle cup to bottom, using cut acid as a flux.
9. Solder bottom in place.
10. Polish the entire project with 00 sandpaper or emery cloth.
11. Lacquer the project.

---

others rebinding books for the school library. All of the books were completed and for the most part well done. Several of the boys have shown enough interest to want to continue with the work after completing their merit-badge requirements.

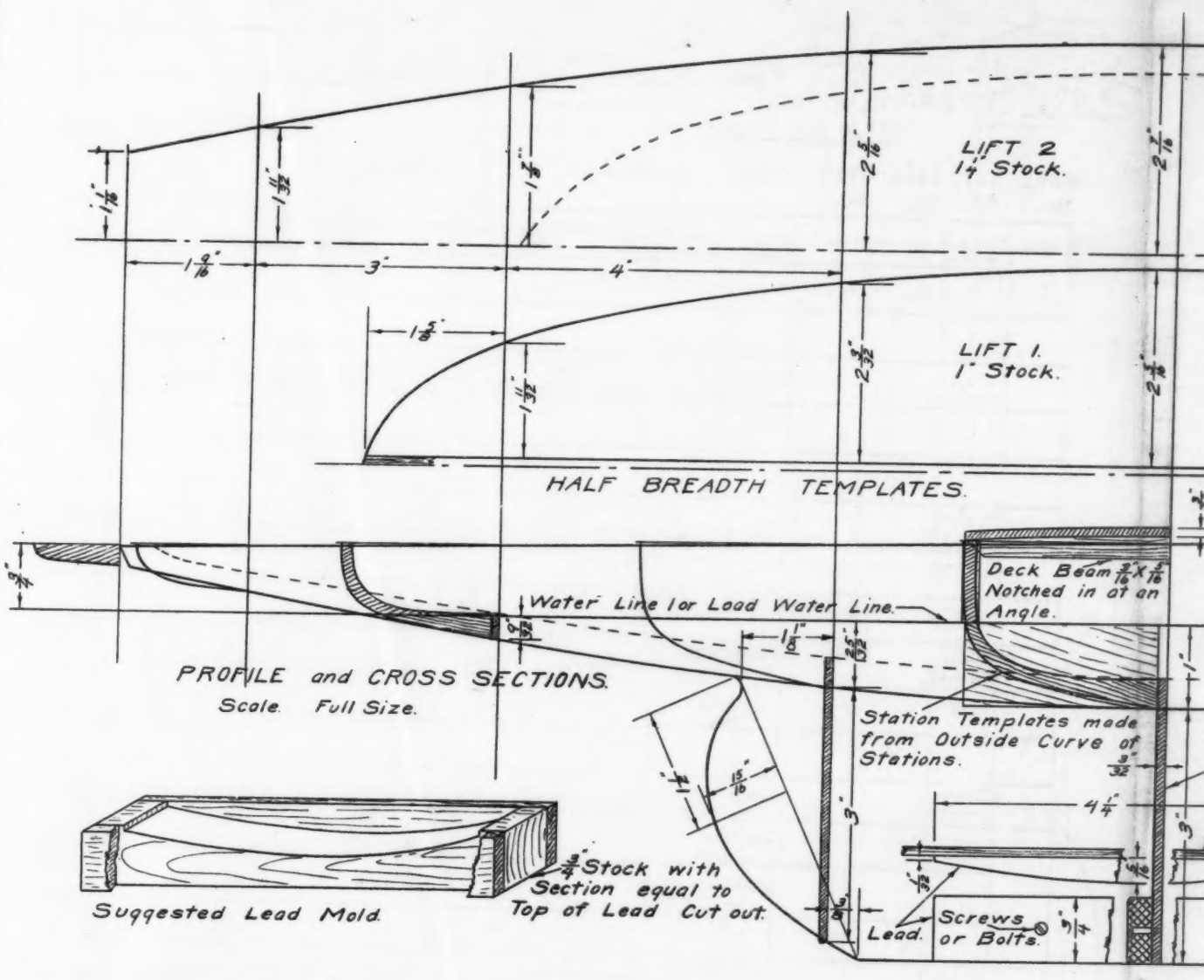
For the metal-craft merit badge the requirements call for examples of work involving riveting, soldering, piercing, and hammering or beating. While it is, no doubt, intended that four separate articles be made, there are times when it is desirable to shorten the process, and for such occasions the Scout candlestick shown in the photo and job sheet was designed. It combines in one problem all the four requirements and has locally been passed by the metal-crafts examiner. The required element of original design is limited to the pierced panel at the front, since the average boy of 12 to 15 has little ability in making original designs.

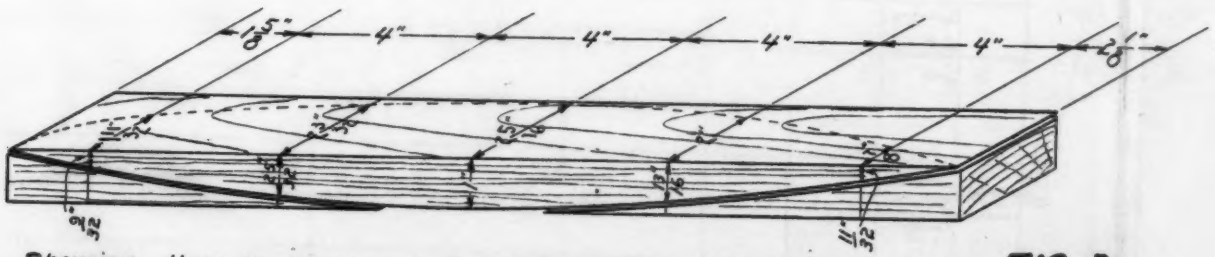
A number of other merit-badge activities fit equally well into the general-shop program and may well be investigated and encouraged. By so doing, the school shop forms a valuable contact with the boys' own interests, and by skillful direction may convert them into a genuine interest in shopwork.

CHOOSING A VOCATION

Choice of a lifework and the attainment of success in it are the result of careful planning and assiduous effort. Mature and unbiased counsel is helpful where decisions are necessary. Fathers and mothers, however, only too often have distorted ideas about occupations for their children. They want their boys to have white collar jobs, wear good clothes, and secure good pay with little regard for the children's abilities, interests, and needs. At times, they are eager to perpetuate the family name in the profession of lawyer, physician, minister, or professor, unsuited though the boy may be to any of these.

Industrial life is becoming increasingly complicated. It is hedged about with barriers difficult for boys to scale and confusing to young men forced to make a choice and yet given little help in the choosing. The hardest job for the boy or girl of today is to determine his or her lifework and the way into it. This means that education cannot be simple, but must be rich in content, abounding in opportunity and extended in its length of service. Helping the average individual to live in this world and to make the right adjustments is a challenge outweighing all the rest. — *F. P. Graves.*

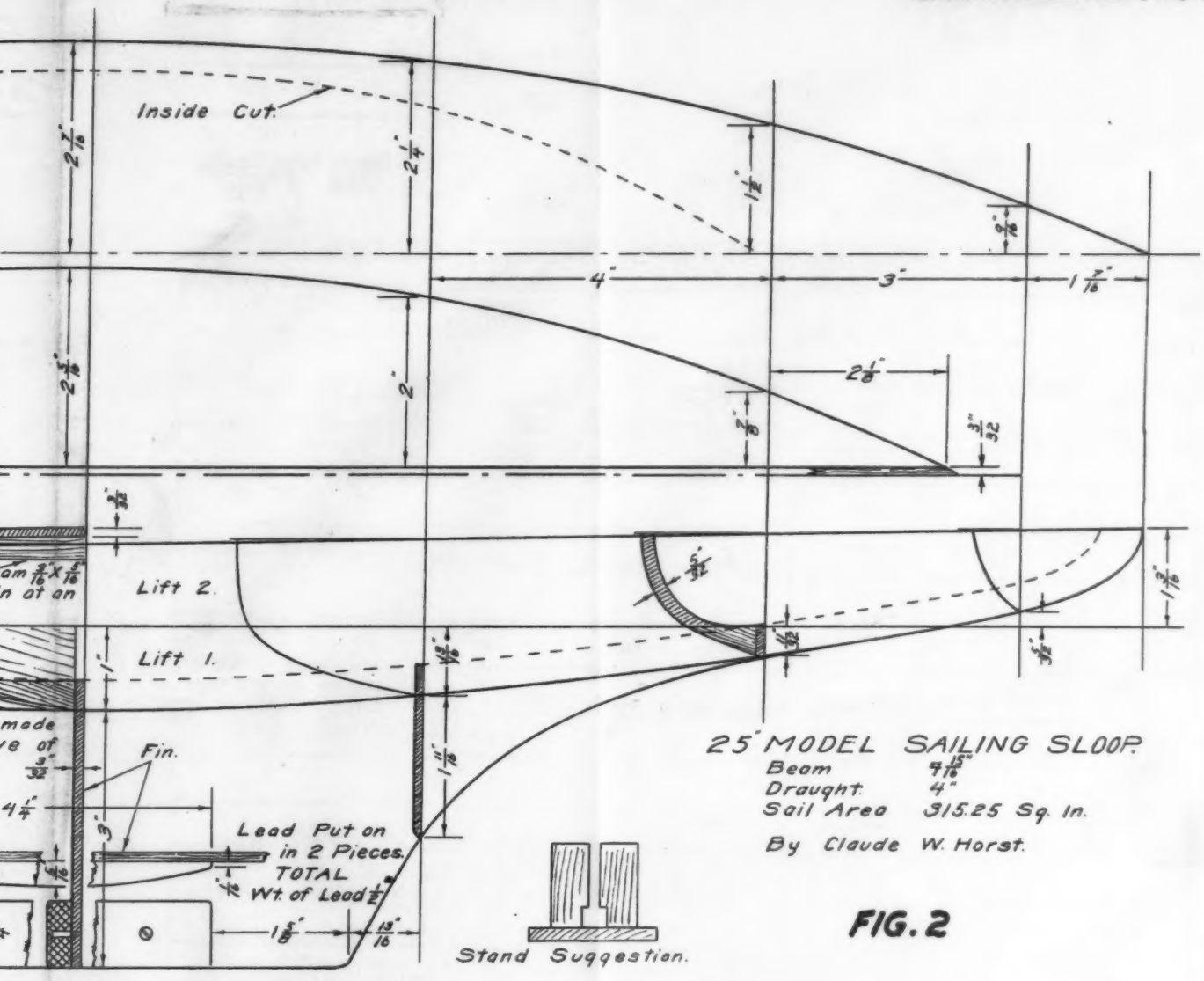

LIFT 2
1/4" Stock.
LIFT 1.
1" Stock.
HALF BREADTH TEMPLATES.
Water Line 1 or Load Water Line.
Deck Beam 3/16 X 5/16
Notched in at an Angle.
PROFILE and CROSS SECTIONS.
Scale. Full Size.
Station Templates made from Outside Curve of Stations.
Suggested Lead Mold.
3/4" Stock with Section equal to Top of Lead Cut out.
Lead.
Screws or Bolts.



Showing How to Mark and Cut Lift 1 Pieces according to Profile. Next Cut the Lift according to Half Breadth.

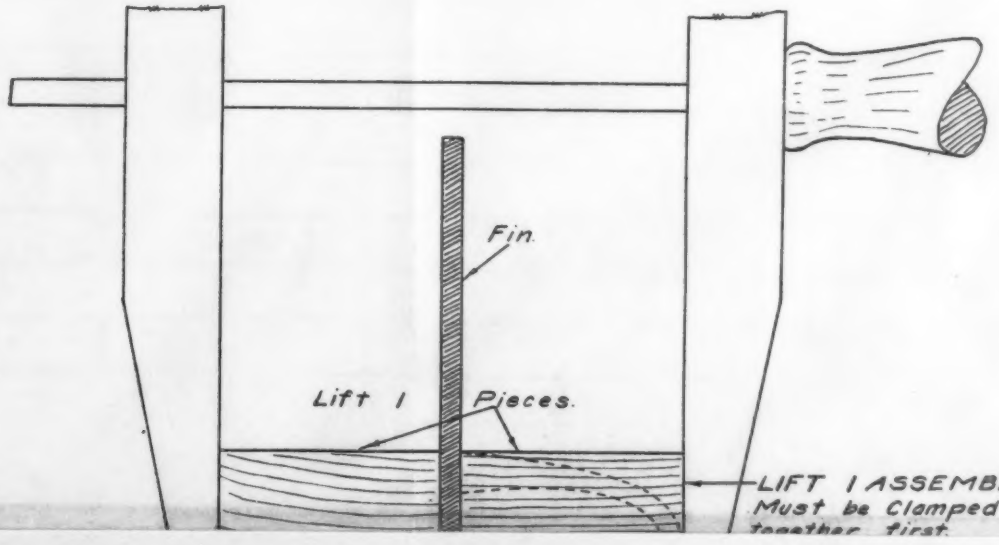
FIG. 3

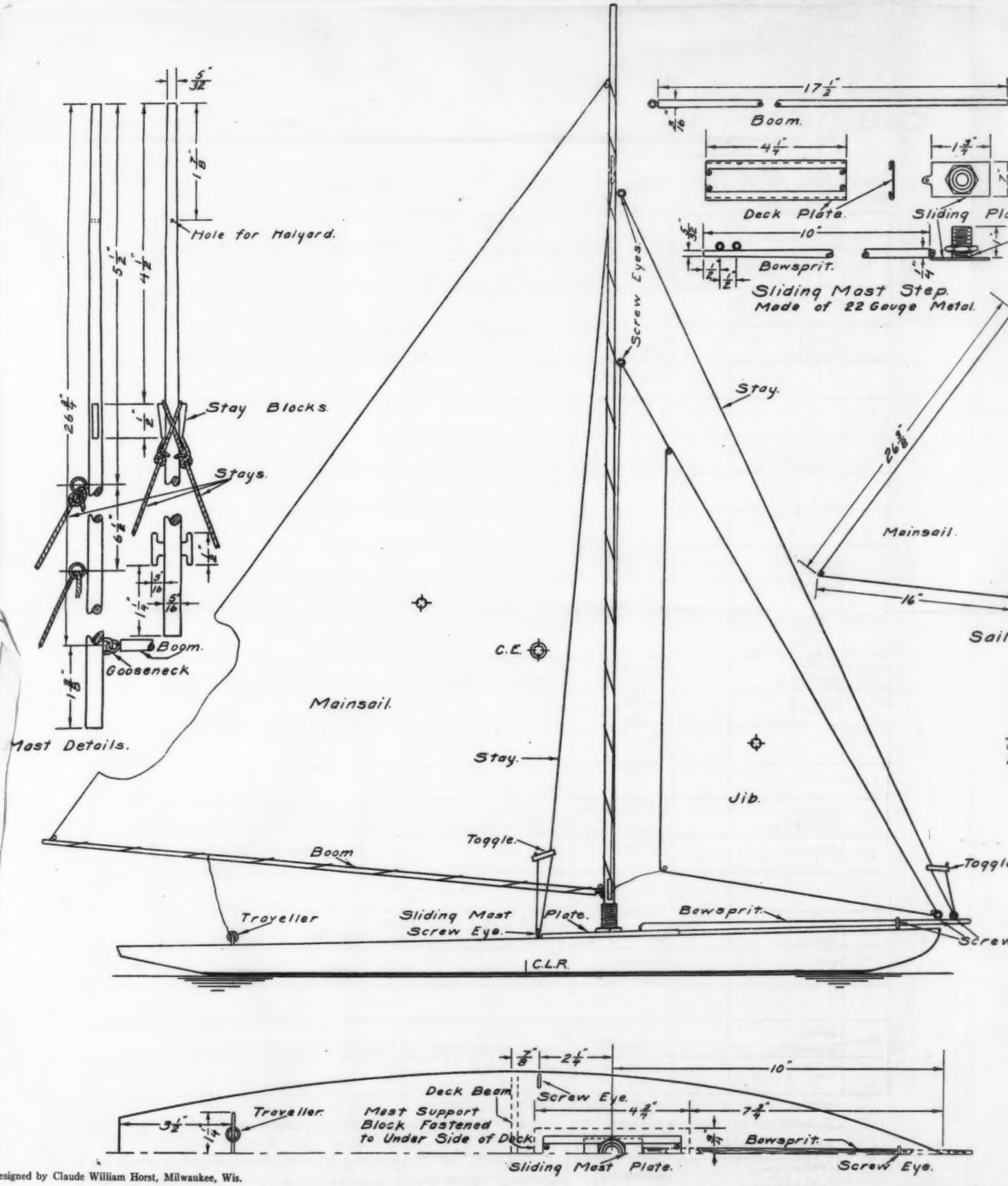
To be Reproduced for School Shop Use Only
Copyright, 1932, The Bruce Publishing Company



25" MODEL SAILING SLOOP.
Beam 9 15/16"
Draught 4"
Sail Area 315.25 Sq. In.
By Claude W. Horst.

FIG. 2





Designed by Claude William Horst, Milwaukee, Wis.

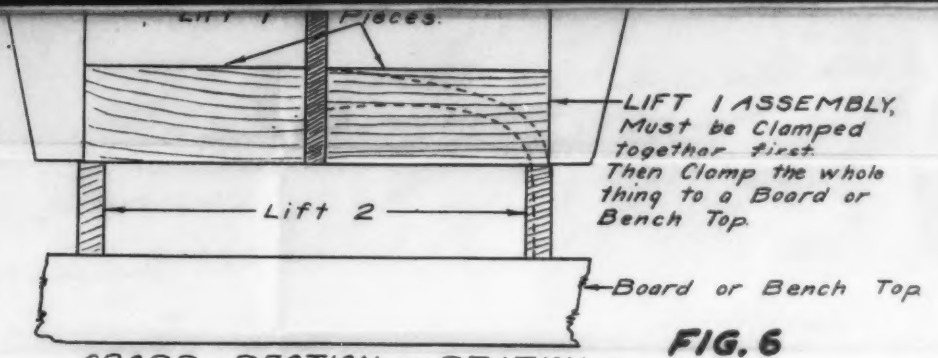
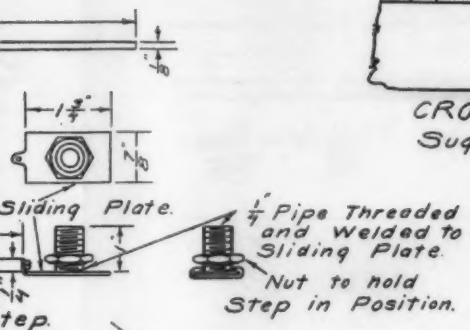
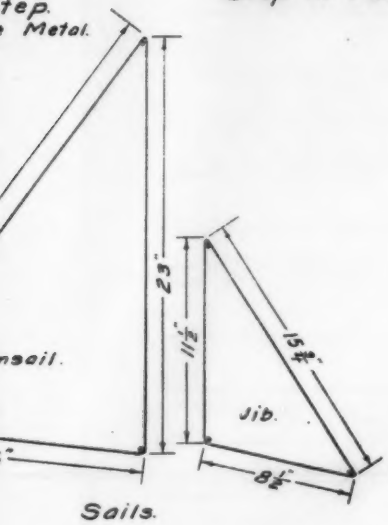

Lift 1 Pieces.
LIFT 1 ASSEMBLY, Must be Clamped together first. Then Clamp the whole thing to a Board or Bench Top.
Lift 2
Board or Bench Top.

FIG. 6

CROSS SECTION — STATION 4
Suggestions for Assembling Hull.





Traveller Driven into Hull.

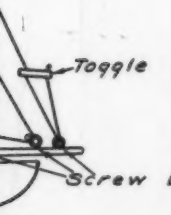
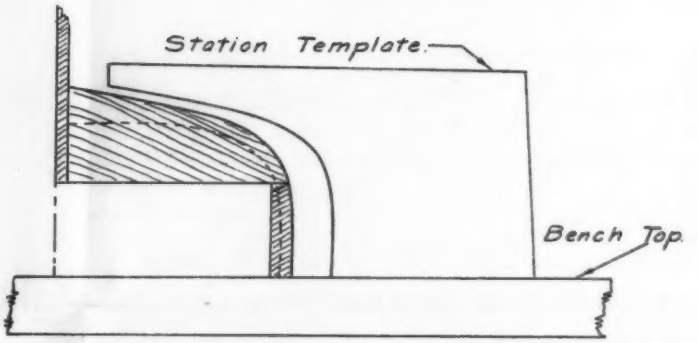


FIG. 9



Application of Station Templates when Shaping the Outside.

FIG. 7

TEMPLATE, PROFILE LAYOUTS, SAILS, SPARS, AND OTHER DETAILS FOR A TWENTY-FIVE-INCH SAILING SLOOP

Described Elsewhere in This Issue

PROBLEMS & PROJECTS

A TWENTY-FIVE-INCH SAILING SLOOP

Claude William Horst, Milwaukee Vocational School, Milwaukee, Wisconsin

(See Supplement No. 256)

This little model sailing sloop is fast, easy to build and inexpensive. It also is easy to sail because the sliding mast plate permits the whole sail combination to be moved forward or backward as may be required in order to get a perfect sailing balance. With this feature no rudder is necessary.

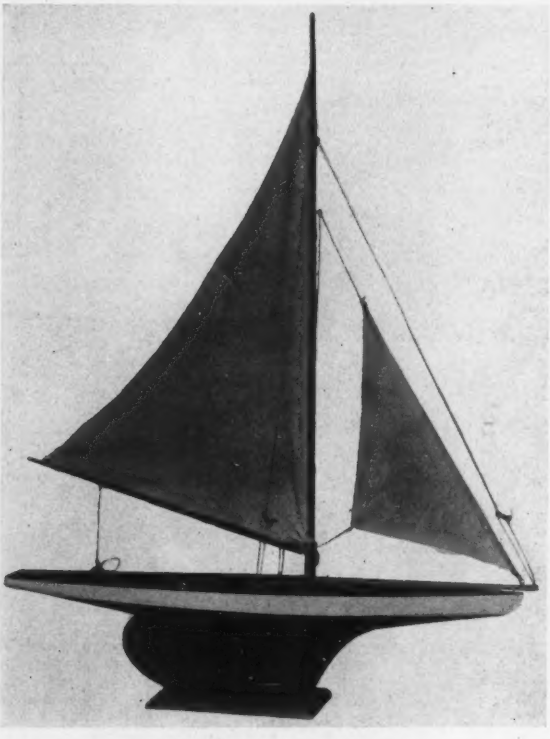


FIG. 1. A 25-INCH SAILING SLOOP

If several models are to be made from the same plans, a set of templates should be made first. If only one is to be built, the curves may be laid out directly on the stock. The procedure is the same in either case.

The hull is made of two lifts or layers. Lift 1 is made of three pieces — the fin and two half lifts. Lift 2 is made of a single piece. Select material according to the dimensions given in Figure 2. The two side pieces for lift 1 are made of 1-in. stock, and lift 2 is made of 1¼-in. stock. Be sure that the pieces for lift 1 have a working (or inside) edge that is square with the surfaces of the material.

Laying Out the Lifts. Draw transverse lines on both lift 1 pieces as shown in the drawing. Measure out on these lines the distance given on the drawing to locate the points through which the curves of water line 1 of lift 1 will be drawn. To draw the curve, tack a flexible batten along the points and mark through them. The sharp curve at the aft end is drawn with a French curve. As both pieces are identical the first may be used to mark out the second.

Lift 2 is marked out in the same way except that since the lift is in one piece a center line must first be drawn and the curve developed from it in the manner outlined for lift 1. Now draw the profile curve on both of the lift 1 pieces according to the drawing, in the manner described above for the half breadth curves, and cut out the lift 1 pieces according to the profile curve of Figures 2 and 3, on the band saw or by hand. The inside profile edge (which goes against the fin piece) must be accurately shaped, according to the drawing. It is much easier to do this before the assembling.

When cutting out the half breadths of the lifts on a band saw or by hand, leave an allowance which may be finished to the line with a disk sander or by hand. For cutting out the interior of lift 2, drill a hole at each end of the center line, and use a keyhole saw.

The fin is made of 3/16-in. hard wood shaped according to the dimensions given in Figure 2.

Assembling. Figure 4 shows the lift pieces and the fin ready to be assembled. Place lift 2 upside down on the bench and mark the exact location of the entire lift 1 assembly. Apply glue to all the contact surfaces of all the pieces and arrange them as shown in Figure 5. Then apply the clamps, clamping the lift 1 assembly together first, Figure 6. Then clamp the two lifts together. Use casein or other waterproof glue and do not disturb for 24 hours.

Shaping. Make a profile template for both ends of lift 2, and shape the ends to the profile, fairing them in with the profile of lift 1. The deck line which is perfectly straight is also shaped at this time. After the hull is shaped to the profile, mark off the hull transversely as shown in the drawing and make the corresponding station templates according to the drawing, Figure 7. Now shape the outside with a drawknife, plane, or spokeshave, fitting the templates at their proper places.

To hold the job securely while shaping the outside, screw a piece of scrap stock 1 by 2 by 20 in., on the center line of the top surface and clamp this in a vise. While hollowing out the inside, clamp the fin in a vise. Care must be taken not to exert too much side pressure as it might crack the fin. The hull is hollowed out with a ¾-in. gouge.

The Deck. Figure 8 shows the hull ready for the deck beams and three coats of paint inside. The deck is made of 3/32-in. or ⅛-in. mahogany. Lay the hull upside down on the material and mark out. Cut on the outside of the line, but close to it. Glue a block ½ by 2½ by 4¾ in. to the underside as shown in the drawing, Figure 9. To this the sliding mast plate will be fastened later. The top of the block must be rounded to fit the contour of the deck beams. Give the underside three coats of paint, and fasten to the hull with ¾-in. brads. Trim off the edge of the deck even with the hull all around, as any overhang may interfere with the sailing qualities of the boat. Give the top side of the deck three coats of varnish, then give the entire outside of the hull three coats of flat white, sanding carefully between coats. If any of the paint is smeared on the varnish — which, of course, should be thoroughly dry — wipe off immediately with a clean rag.

Ballast. The model requires ½ lb. of lead, which is molded in two pieces each weighing a ¼ lb. as shown in Figure 2. If a scale is handy, place the mold on the scale and balance, then pour in ¼ lb. of lead and repeat for the second piece.

Before fastening the lead to the fin, as shown in Figure 2, place the model in the water and lay the lead on the deck to

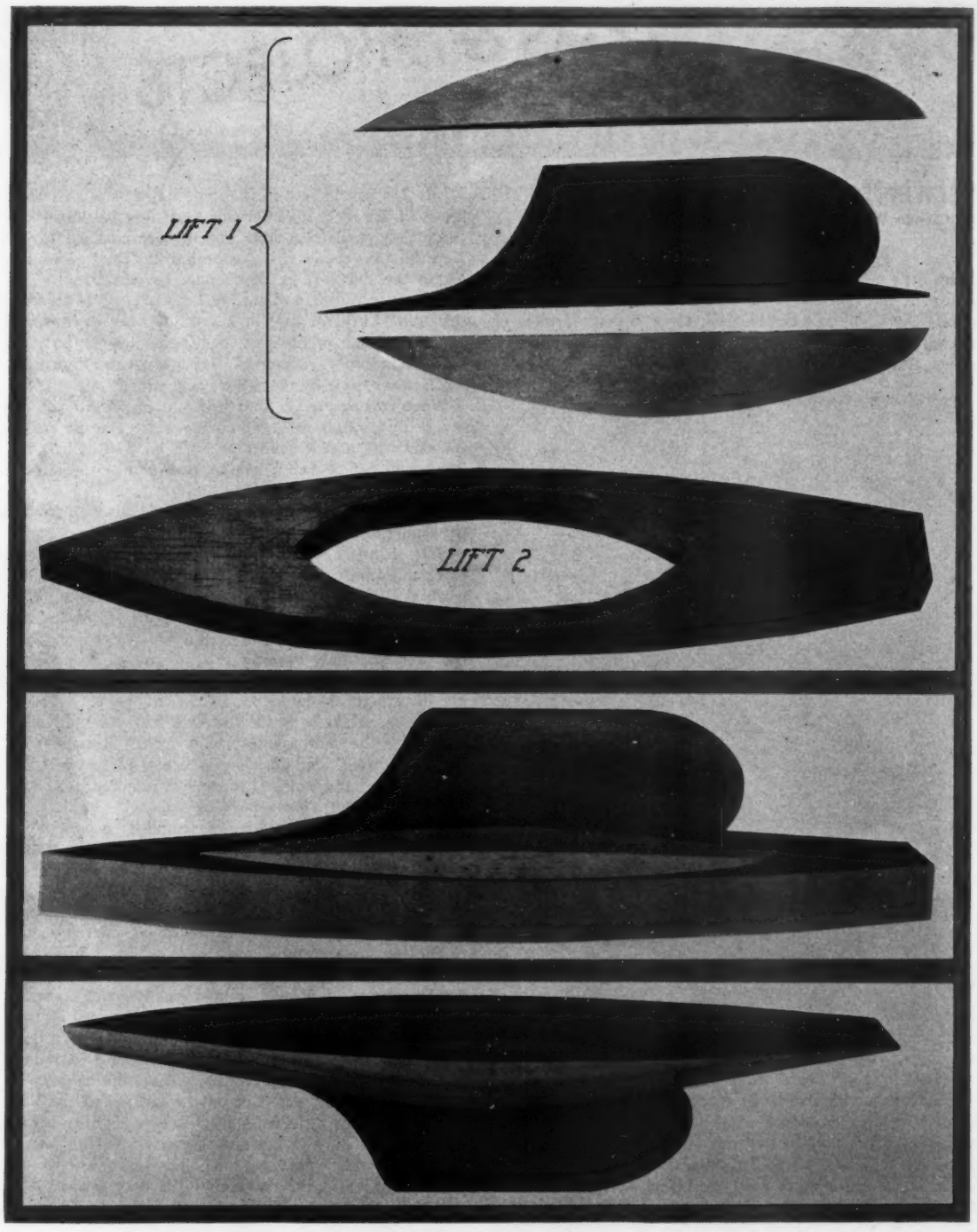


FIG. 4. THE LIFT PIECES AND THE FIN
FIG. 5. THE HULL PIECES ARRANGED IN THE PROPER ORDER FOR GLUING
FIG. 8. THE HULL READY FOR THE PAINT

determine just where it should be placed to give the proper lateral balance or trim. Then mark the position of the lead on the side of the hull and project this point to the fin. Fasten the lead with small brass bolts or screws, one piece on each side of the fin and even with the bottom of the fin. If screws are used, the holes should be staggered as the screws go nearly through the fin. The heads of either screws or bolts should be countersunk into the lead and the holes puttied.

Rigging. The rigging and deck fixtures are shown in Figure 9. The sail should be made of light-weight material — longcloth does very well. They should be accurately hemmed, preferably with a sewing machine. Any shoe-repair man will gladly put an eye in each corner of the sails. The spars are made of spruce and according to the dimensions given in Figure 9. Fish line makes good stays. The toggle joints and cleats may be made of any hard wood. The traveler is made of No. 12 wire bent as shown. Drill the deck and drive the traveler into the hull.

Final Finish. Give the entire outside of the hull two coats of enamel. After the second coat is thoroughly dry, place the boat in water and mark the water line. After the boat is completely dry give the under-water body two coats of dark-green

enamel. To get a clean-cut job, tip the boat over on its side and paint one side. After that side is thoroughly dry tip it the other way and paint the opposite side. This method takes a little longer but insures a good job, and a good piece of workmanship deserves a good paint job.

The Stand. The stand is made according to Figure 2. It should be well made to show the boat off to the best advantage. The stand should always be taken along whenever the boat is to be sailed.

A PORCH LANTERN

F. E. Tustison, The Stout Institute, Menomonie, Wisconsin

The following project is especially adaptable to the general shop with meager equipment. The procedure as outlined indicates many standard metal processes performed with simple tools. The cost of the complete lantern without a canopy switch is about 25 cents.

The lantern calls for a metal bracket to support it. This will give additional experiences in metal work.

The wiring of the lantern adds knowledge along electrical lines.

Tools

Square, scriber, dividers, tin snips, hand punch, hammer, stakes or pipe, rivet set, ball-peen hammer, metal vise, center punch, hand or bench drill, drill bits, ⅛-in. pipe tap, hack saw, file.

Material

No. 26 black iron; ¼-in. round iron; No. 10 by ¾-in. flat iron; r.h. iron rivets, ⅛ by ¼ in.; r.h. iron machine screws, No. 6 by ¼ in. with nuts; socket; ½ by ⅛-in. pipe nipple; No. 18 black fixture wire; canopy switch (if desired).

Procedure:

1. *Lay out the body and top.* Lay out directly on the metal. A pattern is suggested for the ellipse. (See *Instructional Units in Hand Woodwork*, page 100).[1]

2. *Cut out body and top.* Use straight snips for outside lines and curved snips for ellipses.

3. *Punch the rivet holes.* Use hand punch or punch and hammer.

4. *Hammer-mark the surfaces.* Use peen of the hammer and make marks rather deep.

5. *Form the curves.* If stakes are not available use iron pipes.

6. *Rivet the joints.* Rivet the top and body separately but do not assemble. *Note:* Do not rivet top and bottom holes in the body or the center hole in the top.

7. *Make and fasten the eye.* Cut and form the eye. Flatten the ends by hammering and drill holes to suit. Fasten eye with rivets or with small r.h. iron machine screws and nuts.

8. *Make and fasten socket support.* Cut, bend, drill, and tap socket support; then rivet to body or use machine screws and nuts. Support is fastened at front and back of body.

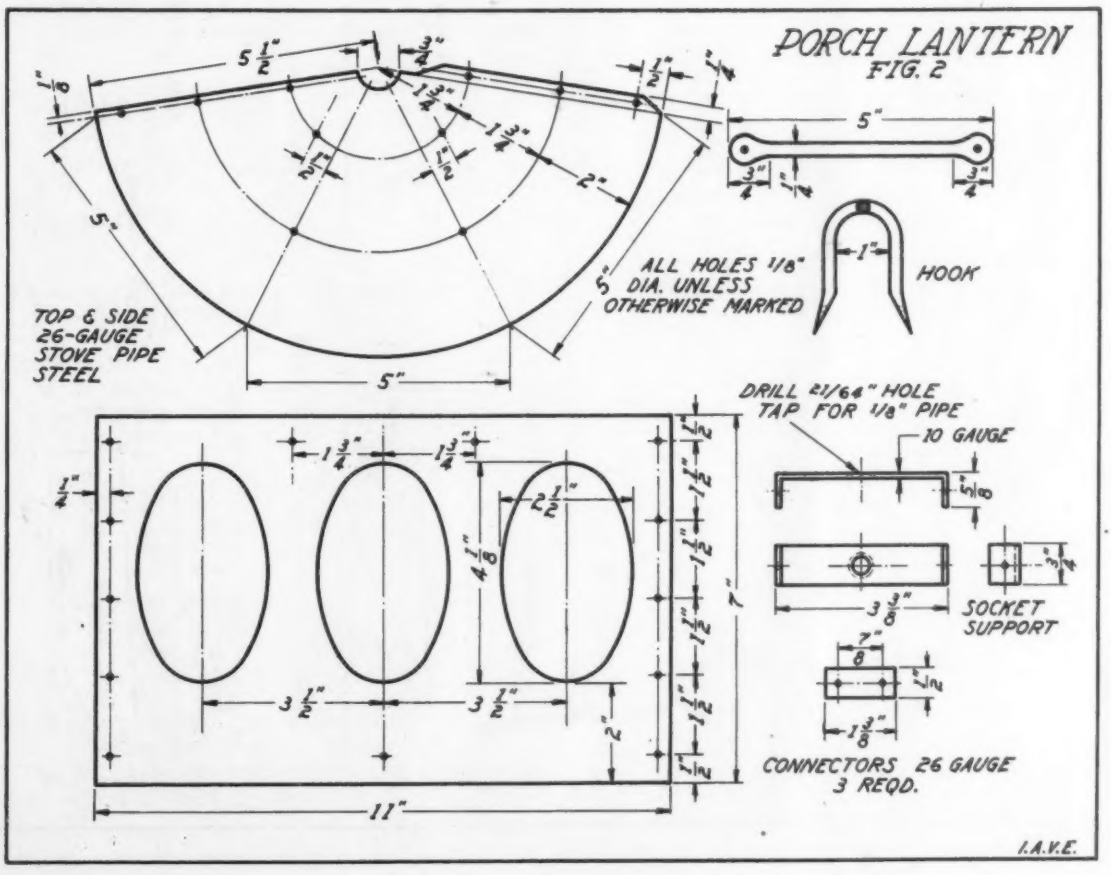
9. *Make and attach connector plates.* Cut, punch, and then rivet connector plates to body.

10. *Attach top to body.* Use small machine screws and nuts to attach top to body at the connector plates.

11. *Finish.* Paint, lacquer, or wax lamp to suit. A neat finish is obtained by heating over a gas flame and coating with linseed oil. Colors from straw to blue may thus be obtained.

12. *Wire the lantern.* Attach the socket (Hubbell, keyless No. 3921, or Bryant No. 95 with side entrance cap) with short ⅛-in. nipple. Wire with No. 18 black fixture wire. If switch is desired use a canopy switch set in the base. (See Fig. 1.)

[1]Published by The Bruce Publishing Company, Milwaukee, Wis.



13. *Hang the lantern.* Use a bracket similar to Figure 1. (See *Job Sheets in Home Mechanics,* Sheet No. 53.)[2] Lamp cord can run into lantern and attach to fixture wire in the top if desired. A flame bulb makes a neat assembly.

THE KICK SLED AS A WINTER PROJECT

Frederick J. Quigley, N. H. Fay High School, Dexter, Maine

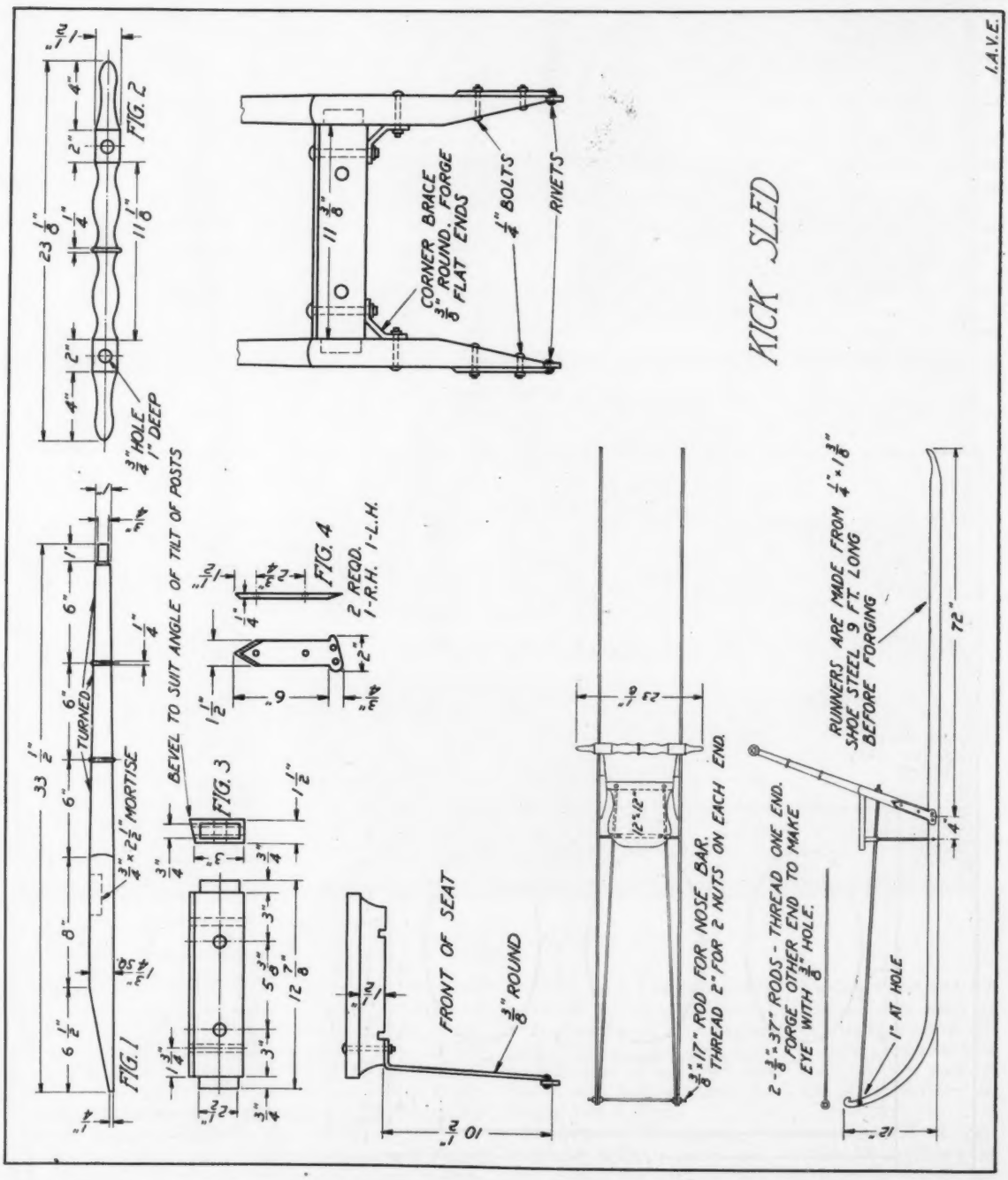
The accompanying illustrations show a popular method of travel and coasting in Maine. The kick sled, as the name implies, is propelled along the level by standing on one runner with one foot and pushing or kicking with the other foot. When coasting, the operator stands on both long, flexible runners and steers by twisting them. A strap or network of rope across the upright posts makes a comfortable lean-back for the passenger.

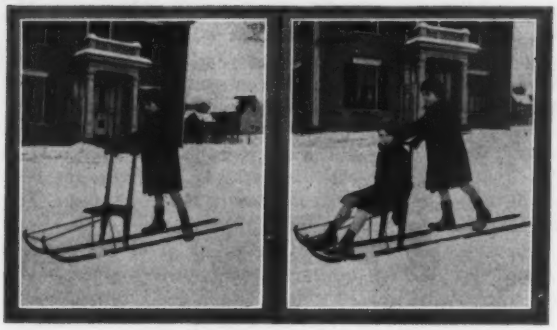
The kick sled is an ideal project for students in high school as it embraces wood turning, jointing, and forging. The runners are made of ¼ by 1⅜-in. sled-shoe steel. The rods and braces are made of ⅜-in. round iron.

The iron braces, Figure 4, are made of ¼ by 1½ by 6¾-in. stock. They should be made right and left and riveted to the runners before assembly. Adjust nuts on nose bar to make runners parallel.

The posts, Figure 1, and handle, Figure 2, are turned out of selected hardwood. The crosspiece, Figure 3, to which the

[2]Published by The Bruce Publishing Company, Milwaukee, Wis.





seat is attached is tenoned and pinned into the posts. The handle should also be pinned to the post to avoid pulling off.

Painting the iron black, and the wood bright red, turns this sled into a very attractive job.

Last year 20 of these sleds were made in the writer's shop and this year we expect to make about the same number.

CIRCULAR SAWS, THEIR CHARACTERISTICS AND USE—III

John E. Doren, Supervisor of Industrial Education, Eureka, California

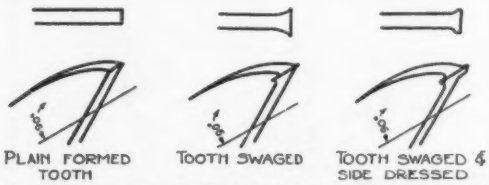
(Continued from November)

Section II — Rough-Cutting Saws

The Circular Rough Ripsaw

A. The *rough ripsaw* is designed:
1. For fast ripping of all kinds of lumber where accuracy and smoothness of cut are less important than speed.
2. For ripping rough, crooked lumber without first jointing and edge.
3. For ripping green or poorly seasoned lumber.

B. Characteristics of rough ripsaw
1. The body of the saw blade is of uniform gauge throughout.



ALL SWAGED TEETH SHOULD BE DRESSED SQUARE ACROSS FRONTS
SWAGED RIP SAW TOOTH
FIG. 5

2. The teeth.
a) All teeth are alike in profile and uniform in size.
b) All teeth are broadly swaged, or spring set for clearance. (See Figs. 5 and 6.)

FIG. 6
SPRING-SET TEETH ARE OFTEN DRESSED SLIGHTLY BEVEL ON THE FRONTS

c) The *fronts of the teeth:*
(1) Swaged teeth are dressed square across.
(2) Spring-set teeth are often dressed with a slight bevel, but are also dressed square across by some users.

d) All rough ripsaw teeth are *hooked* for fast cutting. (See Fig. 7 and notes.)

e) The gullets are comparatively large and deep, to chamber the dust and prevent the saw clogging in a cut.

C. Operation of rough ripsaw
1. Swaged tooth saws cut faster than saws with spring-set teeth, but require more power to drive them in a cut.
2. Saws with comparatively large teeth are best adapted to ripping thick lumber.
3. Saws with comparatively small teeth are best adapted to the ripping of thin lumber.

Note: Saws with teeth 1½ in. from point to point are well adapted to the ripping of lumber from 1 in. to 3 in. thick. Saws with teeth less than 1 in. from point to point are best adapted to the ripping of lumber less than 1 in. thick.

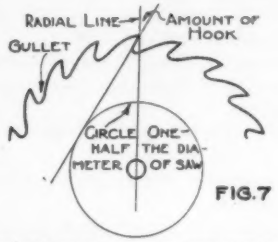


FIG. 7
THE HOOK OF A TOOTH IS THE AMOUNT IT LEANS FORWARD OF A RADIAL LINE AS SHOWN ABOVE.
THE SHAPE OF A TOOTH MOST COMMONLY USED IS ONE WITH THE TOOTH FRONT TANGENT TO A CIRCLE HAVING A DIAMETER EQUAL TO ONE-HALF OF THE DIAMETER OF THE SAW

4. Safety:
a) The top of the saw should extend no more than ¼ in. above the top of the lumber.
b) The splitter guard should always be used and the point-of-operation guard should always be used when practicable.
c) Push-sticks of sound material and safe design should always be used to push the last end of lumber past the saw blade. (See Fig. 7A.) They should be made of lumber from ⅜ to ¾ in. thick.

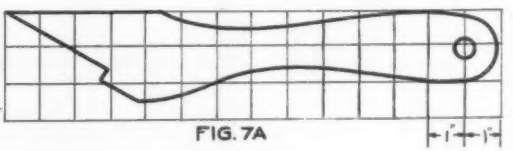


FIG. 7A

d) The saw operator should always stand out of line of the saw when ripping lumber; that is, he should *never* stand so that his face and body are in line with the saw. Splinters and knots that are thrown back will then pass to one side of the operator.

e) Saw guards that are suspended over the top of the saw and are independent of the ripping fence, are very effective in keeping the operator's hands away from the saw. Such guards should always be used when the character of the work will permit. At times there is ripping to be done that will not permit the use of the overhead guard. Such a job is the ripping of thin strips. At such times other guards must be

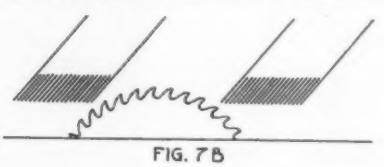


FIG. 7B

provided. The *feather board* shown in Figure 7B frequently fills the need. Such a feather board may be made out of any piece of sound lumber, though

hard wood is preferable. The end should be cut at an angle, as shown, and a number of saw cuts made in the end about ⅛ in. apart and about 2 or 2½ in. deep. The feather board should be clamped to the ripping fence at the in-feed side of the saw, and as close to the saw as possible without touching. A second feather board may be used to hold down the work after it has passed the saw if it seems wise. (Fig. 7B.)

5. Oversize allowances. Sound judgment is essential to avoid unnecessary waste. If lumber is to be finished smooth on the edges after being ripped, an allowance of at least 1/16 in. oversize must be made for every edge that is to be finished smooth later.

Questions for Thought and Discussion

1. Why are the teeth of the ripsaw relatively large with deep gullets between them?
2. Why are the points of rough ripsaws heavily swaged or spring-set?
3. Why will a saw with swaged teeth cut faster than one with spring-set teeth?
4. Why are swaged teeth dressed square across the fronts?
5. Why should the splitter guard always be used when one is ripping with a circular saw?
6. Under what conditions will it be impossible to use a "point of operation" guard of the type generally used; vis., one supported above the saw which is more or less automatic in its adjustment?
7. How could a "feather board" be used to advantage when the work is of such a character that the ordinary guard is not convenient or in the way?
8. Why should the operator always stand out of line of a revolving saw?

PORTABLE PING-PONG OR INDOOR-TENNIS TABLE

Jos. J. Lukowitz, Milwaukee, Wis.

As the summer wanes, interest is aroused in various indoor sports. Ping pong, or indoor tennis, supplies interest, competition, and light exercise. The regulation size ping-pong table is 5 by 9 ft., but a 4 by 8-ft. table will serve very well. A feature of the table shown and described in this article is its simplicity and portability. The construction is very simple. Any suitable wood may be used for the legs and rails. The end rails may be doweled and glued to the legs. Plywood serves best for the top. The top is made in two sections, so that it is easier to handle. The cross-lap joints on the rails should be made a snug fit; not too tight nor too loose. The gate hooks give rigidity to the frame.

The table may be stained, shellacked, varnished, painted, or enameled. The top, however, should not be finished glossy, nor should it be painted white, because under certain conditions of sunlight or artificial light, an annoying glare will be produced. A green stain or paint would be appropriate for the top. A narrow border of white, an inch or so wide, would accentuate the top and resemble the border of a regular tennis court. Other markings may be added with paint or chalk. Net, balls, and rackets are readily obtainable at small cost.

FOOTBALL SCORE BOARD

P. T. McHenry, Arkansas State Teachers College, Conway, Arkansas

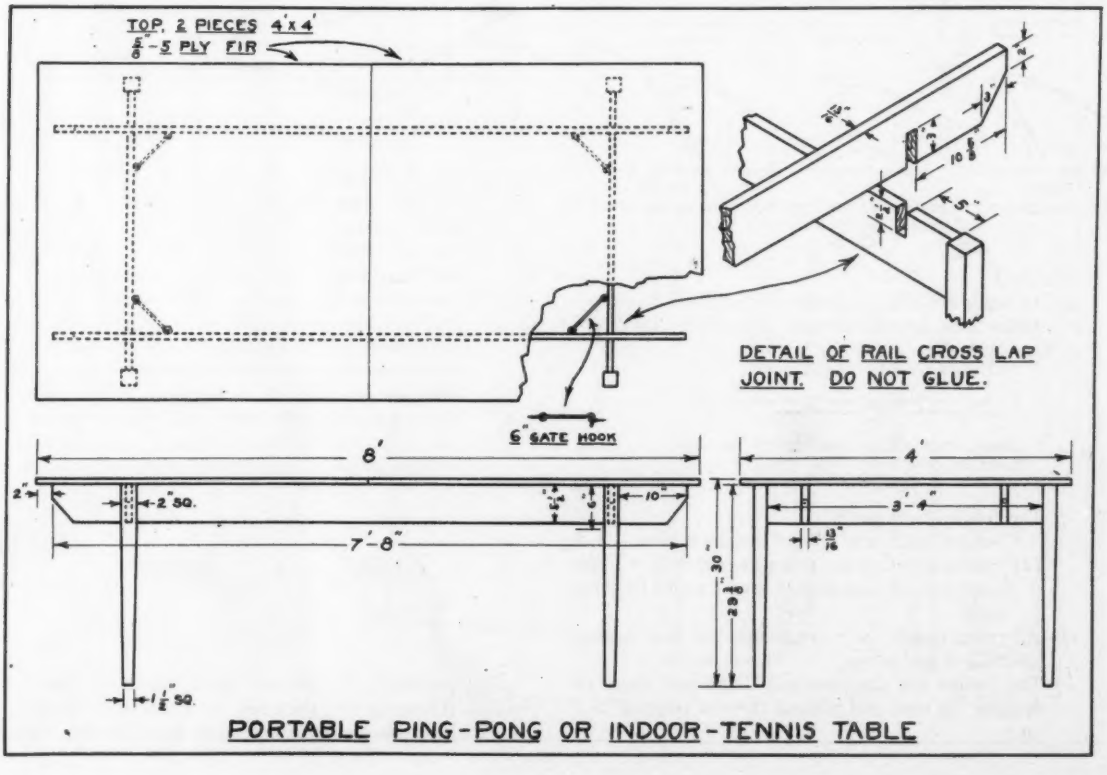
The football score board shown and described herewith was designed and built in our industrial-arts shop.

Figure 1 shows how the score board looks from the field, and Figure 2 shows how and of what it is made.

The ball is painted tan and shaded to give an oval appearance. The base, the lacing, and the emblem — in our case, the bear — are black. All letters are white. The numbers which are 7 by 11 in. are painted on sheets of galvanized iron 9½ by 12 in. The background is painted white and the numbers are black. Four pieces, numbered 1 to 4, are required for the downs; and the score, yard line, and yards to go, require eight sets of numbers from 0 to 9.

The numbers are slipped into grooved cleats fastened back of the openings in the front panel.

By means of a telephone at the board and one at the end



PORTABLE PING-PONG OR INDOOR-TENNIS TABLE

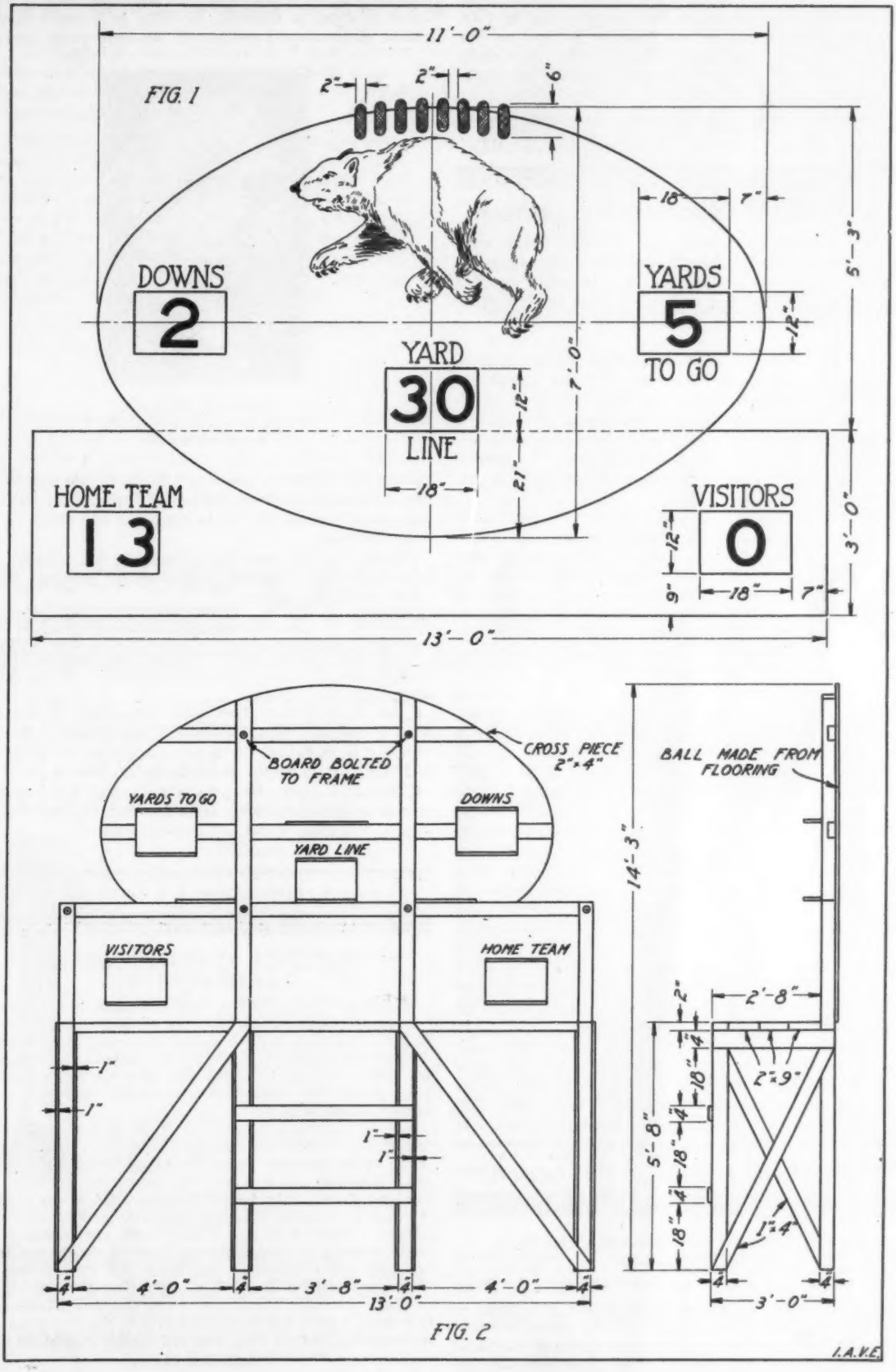


FIG. 1
11'-0"
2"
2"
6"
DOWNS
2
YARDS
5
TO GO
YARD
30
LINE
HOME TEAM
13
VISITORS
0
18"
7"
5'-3"
12"
7'-0"
21"
3'-0"
9"
13'-0"
BOARD BOLTED TO FRAME
CROSS PIECE 2"×4"
BALL MADE FROM FLOORING
YARDS TO GO
DOWNS
YARD LINE
VISITORS
HOME TEAM
14'-3"
2'-8"
2"×9"
5'-8"
1"×4"
4'-0"
3'-8"
4'-0"
3'-0"
FIG. 2
I.A.V.E.

of a cable long enough to reach the length of the field, the boys operating the numbers are kept informed play by play, as to position of the ball, the down, and the yards to go. The telephone arrangement, in our case, is furnished and maintained by the local telephone company in return for complimentary tickets to the games.

Now, Are There Any Questions?

LACQUERING OPEN-GRAINED WOODS

965. Q.: Please give correct procedure to follow when finishing walnut or other open-grained woods with clear lacquer; the lacquer is to be sprayed. Is it necessary to apply shellac over the filler before applying the clear lacquer? What should be used to clean the lacquer surface between coats? — *J.H.D.*

A.: When walnut or other open-grained woods are filled, a certain definite procedure is necessary. First, the filler should be made on a four-hour varnish base with a minimum of linseed oil in order to assure hard bottom drying. Nevertheless, 48 hours in a warm room should be allowed for this purpose, less than this amount of time may be the cause of a number of troubles which occur when lacquer is sprayed over improperly dried fillers.

Following the filler, a reduced coat of very thin-bodied shellac and shellac-mixing lacquer should be used as a sealer. High-grade results, however, do not always follow in the cases of some improperly compounded lacquers whose solvents occasionally react unfavorably with the sealer coat, causing sinking and pitting of the finish over the poor areas. To overcome this, a number of sealers have been put on the market which do not carry lacquer solvents and which, when dried, are not reacted upon by subsequent finishing coats. In applying these sealers, follow the directions given by individual manufacturers.

Any number of clear lacquer coats may be applied one over the other as soon as they are dry. It is absolutely unnecessary to sand between coats of lacquer. Assuming that the surface has been properly sanded and prepared before finishing, several coats of lacquer may be applied without further sanding. The reason for this is, that each coat partially dissolves the one immediately preceding and the several applications thus unite to form a homogeneous film. All finish sanding and rubbing needs therefore to be done on the last coat only. It is this chemical and physical peculiarity which permits the turning out of a modern high-grade car finish in a few hours as compared with the many days of the old varnish schedules. These conditions do not apply to varnish coatings which must be sanded between applications in order to secure adequate bondings which at best are none too good.

The final surface in lacquer may best be rubbed out by sanding with No. 400-A production paper backed up by a felt or rubber rubbing pad and dipped in crude oil, or water and gasoline. This may be followed by changing to FFF pumice stone and rubbing pad although the No. 400 paper skillfully handled produces a splendid finish. — *Ralph G. Waring.*

Among Industrial-Arts Teachers

PRESIDENT BURTON E. NELSON HONORED

The faculty and students of The Stout Institute, Menomonie, Wis., joined in celebrating the fiftieth anniversary of President Burton E. Nelson's entry into the educational field.

Mr. Nelson started his school-teaching career at the age of 15 in a country school among the Allegheny Mountains in Pennsylvania. As he advanced, he spent four years as high-school principal at Bushnell, Ill. Then he became superintendent of schools at Lewiston, Ill., for seven years; then superintendent of the city school at Lincoln, Ill., for four years; then superintendent of city schools at Racine, Wis., for fourteen years; and in 1923 he accepted the presidency of the Stout Institute.

BURTON E. NELSON
President, The Stout Institute,
Menomonie, Wisconsin

During the fifty years of his work, he has gained many friends, all of whom heartily congratulate him upon his achievements and his success.

¶ Mr. L. H. Kohl, instructor in manual training at Rock Rapids, Iowa, recently received the bachelor of science degree from Iowa State College.

¶ Mr. H. P. Hurley, West Allis, was recently elected president of the Wisconsin Vocational School Directors' Association. Mr. H. O. Eiken, Green Bay, was elected vice-president, and Mr. E. W. Randall, Kenosha, secretary-treasurer.

¶ Mr. F. A. Leabo, formerly of Stillwater, Okla., has been elected to teach metal work and automotive mechanics in the Capitol Hill High School at Oklahoma City.

Associations and Conventions

THE A.V.A. CONVENTION AT KANSAS CITY

Wesley A. O'Leary, of New Jersey, president of the American Vocational Association, announces that all the preparations for the national convention to be held in Kansas City, Mo., December, 7–10 are well under way. He predicts an unusually successful meeting because vocational educators have never had greater need for conferring on their common problems than in these days of extreme economic pressure.

For the industrial-arts men, Prof. R. W. Selvidge, chairman of the Program Committee, announces some interesting programs. Based on the convention theme, "Vocational Education for Changing Conditions," the Industrial-Arts Section for Thursday, December 8, 2 p.m., under the chairmanship of Dr. Homer J. Smith, Professor of Industrial Education, University of Minnesota, there will be a discussion of the "Status, Trends, and Outlook of Industrial Arts in the United States." Charles F. Bauder will represent the East, T. T. Lindsey, the South, Prof. Geo. B. Cox, the West Coast, and Geo. K. Wells, the North Central States.

Friday, December 9, 9 a.m., the topic "Operating Effectively on a Reduced Budget" will be discussed. Wm. L. Hunter, Head of Department of Industrial Arts, Iowa State College, will be the chair-

(Continued on page 8A)

FROM ONE WHO KNOWS

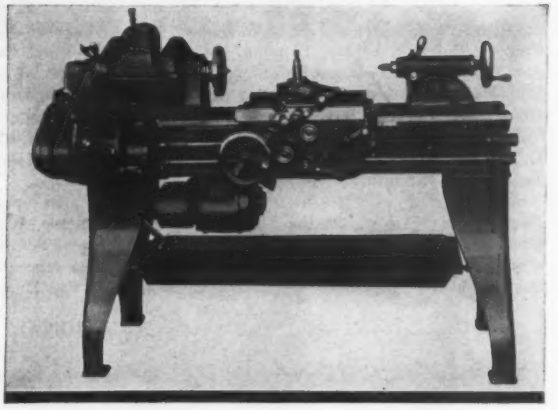
"In twenty-five years of experience I have operated lathes in a school and in commercial machine shops—have been a teacher in an industrial school and a machine designer.

"As a designer I can appreciate the features, advantages and high quality of the Rockford Economy Lathe. As a teacher, I know that this lathe provides everything needed for clear, practical, accurate instruction in modern engine lathe practice. As a machinist, I know that Rockford Economy lathes are popular in a large number of commercial shops, where they are used in tool rooms and production departments. As a student, I know that this lathe is simple, easy to operate, and safe.

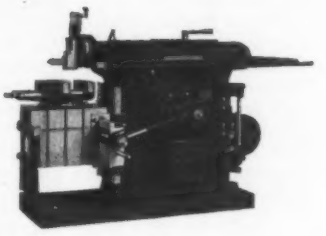
"It will be a pleasure to give additional information to anyone interested."*

**Name on request*

The Special Rockford Economy Lathe, illustrated at upper right, has all the advantages noted above. In addition, we have found a way to include a direct-connected multi-speed motor drive in its standard equipment without exceeding the remarkably low price of Rockford Economy Lathes. Write *today* for description, specifications, and prices.



The Rockford Hy-Service Shaper, shown at right, is an equally accurate, simple, durable, safe tool. It is widely used in commercial shops and priced within the most thrifty school budget. Write for circular.



ROCKFORD MACHINE TOOL CO.

LATHES . . . SHAPERS . . . SHAPER-PLANERS

ROCKFORD, ILLINOIS, U. S. A.

A HEAT-TREATING FURNACE OF EXCEPTIONAL QUALITY

Johnson No. 650 Heat-Treating Furnace

This reliable unit has become extremely popular because it operates without forced air blast. Very efficient for heating all carbon steels. Six powerful Johnson Burners produce any desired heat up to 1800 degrees in the fire-box. There is no oxidation. Ideal for tempering, case-hardening, annealing, etc.

KEEP THE JOHNSON CATALOG ON HAND FOR READY REFERENCE.

JOHNSON GAS APPLIANCE CO.
Cedar Rapids IOWA

Eastern Representatives:
R. M. Henshaw & Co., 221 Columbus Ave., Boston, Mass.
Steinmetz & Co., Inc., 220 So. 16th St., Philadelphia
30 Church St., New York

NEW 8" Swing Bench Lathe with Underneath Belt Motor Drive $153 Without Bench

8" x 36" Junior Underneath Belt Motor Drive Bench Lathe with 1 phase, A. C. 110 Volt Start-Stop Reversing Motor complete as shown less bench $153.00. Price of bench $34.00 extra.

The New Underneath Belt Motor Drive is entirely new, low in price and practical in operation. The entire machine is enclosed, has no overhead obstructions and provides light and freedom of vision when doing fine precision work.

Recommended for the Junior High School, Senior High School, General Shop Laboratory and Machine Shop.

Features

Lathe is back geared screw cutting type which cuts threads 4 to 96 per inch, has power longitudinal screw feeds from .0208" to .0053", hollow steel spindle, tailstock set over for turning taper and many others. Furnished in longer bed lengths up to 48".

Send for General Catalog No. 93
showing complete details of this NEW Lathe, also describing and pricing 96 other sizes and types. Over two hundred illustrations. Mailed postpaid, without obligation.

South Bend Lathe Works

135 East Madison Street South Bend, Indiana, U. S. A.

Lathe Builders for 25 Years—Over 55,000 Users

(Continued from page 360)

man, and the speakers will be O. B. Badger, Ross C. Cramlet, and Frederic Bohning. Friday, 12 noon, there will be the Industrial-Arts Luncheon at the Hotel Baltimore. The toastmaster will be Dr. Wm. E. Warner, Associate Professor of Industrial Arts Education, Ohio State University, Columbus. The topic for discussion is, "What is Next in Industrial-Arts Education?" The speakers will be Dr. Wm. T. Bawden, Everett Wood, Elroy Bollinger, Frank Moore, and Homer J. Smith.

Saturday, December 10, at 9 a.m., under the chairmanship of Dean Clyde A. Bowman, the Stout Institute, Menomonie, Wis., there will be a report of the Committee of Standards of Attainment in Industrial Arts by Dr. Wm. T. Bawden, and a report of the Committee on Tests in Industrial Arts by Roy R. Van Duzee.

OCTOBER MEETING OF BOSTON VOCATIONAL SOCIETY

The Vocational Education Society of Boston held its regular monthly meeting on Saturday, October 8.

Mr. E. L. Palmer, employment manager for the Western Electric Company, Boston, the speaker of the evening, discussed the subject, "Personnel Relations." He described in detail the intricate plan of employee relationship in the operation of a plant. While his company has had a labor turnover of about 10 per cent, it was declared that women employees are gradually being replaced with men, so that the percentage may be later reduced to 6 or 8 per cent. Discussing the possibility of schools supplying all of the labor, Mr. Palmer declared that many of the jobs are so menial that detailed training in the school courses would be unnecessary. — *Louis A. Van Ham.*

ST. LOUIS MANUAL ARTS CLUB HOLDS MEETING

The St. Louis Manual Arts Club of St. Louis, Mo., held its first meeting of the school year at the Dozier Manual Training Center, October 28. Plans for the coming year were discussed, and the following men were elected to serve as officers for the year 1932–33:

President, W. Funk, Bryan Hill School; vice-president, J. Murphy, Marquette School; secretary, E. Mawsdley, Mark Twain School; Treasurer, C. Lonfield, Bryan Hill School; and chairman of social committee, T. Ely, Meramec School. — *J. Ernest Kuehner.*

TEACHERS OF INDUSTRIAL ARTS MEET AT FORT WAYNE

The Manual Arts Club of Fort Wayne, Indiana, held their first monthly meeting on Thursday evening, October 13, at the Hotel Indiana. There was an attendance of 29.

It was voted to furnish carving tools to the boy scouts of the Forest Park School for their open night at the Armory. The club is endeavoring to help people see the value of industrial-arts work.

The next meeting will be held at Muncie. — *Kenneth W. Yager.*

OKLAHOMA CITY INDUSTRIAL-ARTS CLUB

The Oklahoma City Industrial-Arts Club held its regular monthly meeting on October 5, with an almost perfect attendance.

The following committees were appointed:

Program: E. A. Hardy, G. W. Waltrip, and H. A. West.

Social: G. W. Brucher, F. A. Lamb, and Erma Snyder.

Publicity: B. H. Thomas, Jack Whitman, and John Barthold.

Attendance: Russell Browe, Paul Bell, A. E. Phillips, and Archie Courtney.

Research: Claude Keenan, Frank McKee, A. E. Phillips, and James Corbett.

The members of the club are instructors engaged in teaching industrial-arts subjects and the programs consist of inspirational talks by leaders in the industrial field. — *B. H. Thomas.*

PEORIA INDUSTRIAL CLUB HOLDS FIRST MEETING OF THE YEAR

The first meeting of the Peoria Industrial Club for the 1932–33 school season was held October 10 at the Peoria Y.M.C.A. After a six o'clock dinner, Mr. F. E. Hardin, acting chairman, introduced Dr. W. T. Bawden, who gave an account of his three-day series of lectures to industrial-arts teachers at the Iowa State College summer session.

Dean Siepert explained how the industrial-arts department has been able to run a summer school at Bradley for several years, without any help from the endowment except the free use of buildings and equipment.

Mr. C. M. Hewitt, of Bradley, gave a report of his visit to the Olympic games at Los Angeles.

Twenty-seven members were present at the meeting. The next meeting will be held at the Westminster Christian Church in November. — *F. L. Barloga.*

New Publications

Household Physics

By Walter G. Whitman. Cloth, 502 pages, 5½ by 7⅞, illustrated. Price, $2.75. Published by John Wiley & Sons, Inc., New York City.

This is the second edition of the book, and it has been revised and enlarged. The book contains in very readable form the science which underlies the functioning of many of the household appliances which are now so commonly used. It is profusely and well illustrated, and contains much that may be used in the related-subjects work by the industrial-arts teacher.

Apprenticeship — Principles, Relationships, Procedures

By Stewart Scrimshaw. Cloth, 273 pages, 5¾ by 8¼. Price, $2.50. Published by McGraw-Hill Book Company, Inc., New York City.

This book, written by a man who himself has been an apprentice, a journeyman, a state supervisor of apprenticeship, a personnel director, coördinator in charge of coöperative students, and a professor of personnel administration and economics in a university, gives a first-hand, comprehensive dissertation on apprenticeship in general, the relation between the state and apprentice training, and explains quite thoroughly the Wisconsin system of apprenticeship control. The book also contains a very good bibliography on the subject of apprenticeship.

The Story of Steel

By V. S. Spencer. Cloth, 127 pages, 5⅝ by 8, illustrated. Published by Laidlow Brothers, Chicago, Ill.

The author has told the story of steel in the narrative form. A boy is taken through a steel plant and on this visit he is accompanied by a plant official who explains everything from the time that the ore is put into the blast furnace to the rolling of steel shapes, the making of steel products, such as wire, nails, fencing, pipe, and seamless tubing. The story is interestingly told and it is illustrated with enough pictures taken directly from industry to make a boy want to read it.

Inclined Lettering

By Buck and Michelson. Paper, 8½ by 5¼. Price, 24 cents. Published by The Bruce Publishing Company, Milwaukee, Wis.

This edition, called the Capital Letter Edition, consists of 36 exercises which provide practice in making capital letters. The first fifteen exercises might be called the learning course. The remaining 21 provide the student with practice in applying his lettering to drawings and complete sentences.

News Notes

Epsilon Pi Tau Fraternity at Northern Illinois College

A Zeta Chapter of Epsilon Pi Tau, a national professional men's organization, has been organized at the Northern Illinois Teachers' College at DeKalb. Prof. O. E. Sink, Muncie, Ind., presided, and Pres. K. L. Adams welcomed the guests of the evening. Mr. Frank Moore, Cleveland, Ohio, gave a short greeting, and Dr. William E. Warner delivered the main address.

The charter was presented by Prof. Elroy Bollinger of the University of North Dakota, and the presentation of the key was made by Prof. DeWitt Hunt, of Stillwater, Okla.

Announce Ninth Annual Soap Contest

The National Soap Sculpture Committee, 80 East Eleventh St., New York City, has announced the annual soap sculpture contest for small sculptures in white soap for Proctor & Gamble prizes. The contest, which closes in May, 1933, offers four prizes for pro-

(Continued on page 10A)

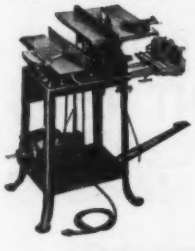
A New Era in Motor-Driven Woodworking Tools for Schools

Delta now offers to Vocational Education the "Multi-Unit" Plan for Woodworking Shops. Under this plan a larger number of compact but efficient motor-driven tools is available for class work. These smaller units are built of enduring materials to fine precision limits and are designed to combine maximum convenience and effectiveness with long years of satisfactory service. Delta "Quality Tools" have passed gruelling production tests in factories all over the country. They are most practical for school use—because they are the type of tools most likely to be used by student after graduation. Best of all, they are priced so low as to permit a larger number of tools per student—and yet come comfortably within 1933 budgets.

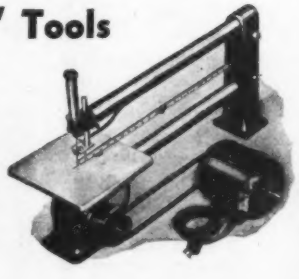
New "Delta" Lathe

This unusual machine incorporates numerous new ideas in construction and design that give it extraordinary strength and rigidity, plus the accuracy and convenience ordinarily found only in lathes selling for many times its price. This is no toy lathe, but a sturdy unit capable of handling precision production work, and priced astonishingly low. See "Delta's" 1933 Catalog for full details.

A Complete Line of "Quality" Tools



"Delta" Woodworking Units are convenient, portable and compact. All are available in a large variety of combinations and at prices to fit all needs. The "Delta" line includues Jointers, Circular Saws, Band Saws, Wood-turning Lathes, Drill Presses, Scroll Saws, Boring, Routing, Sanding and Mortising Attachments, and a complete line of accessories.



New Delta DRILL PRESS

It would take almost a book to completely describe the features, advantages and range of operations of this sensational new addition to the Delta line. Briefly, the new "Delta" Drill Press measuring 68 inches high and provided with a heavy floor base, is a precision tool — built to meet the most exacting demands of production work and yet priced unbelievably low. It incorporates numerous new features . . . including Ball Bearing Spindle, Accurate Chuck, Tilting Table, Enormous Capacity, and many more. It is really two machines in one —as the head can be reversed and used efficiently as a Shaper.

Hollow Chisel Mortising Attachments are available. For full details see the new "Delta" 1933 Catalog.

Catalog Free!

Every man who works with wood will want to see this FREE 1933 "Delta" Catalog of Quality Woodworking Tools. It shows the full line of the latest "Delta" Tools. It is packed with interesting illustrations and descriptions. It describes the latest developments in motor-driven equipment at the astonishingly low 1933 price levels. Be sure to get YOUR copy. Write today.

DELTA MFG., CO., 3775 North Holton St.
Dept. E1232, Milwaukee, Wisconsin

Visit the Delta Demonstration Booth at the A. V. A. Convention in Kansas City
Booth No. 12

THE PRINTING TRADES AND THEIR WORKERS

(Just off the press)

By Florence E. Clark

Counselor, Flower Technical High School, Chicago

In cooperation with the

National Vocational Guidance Association

Many books and pamphlets containing occupational information have been published independently by various educational sources but their adaptability has frequently been limited to the communities where they were written. Educators recognizing the need for improved studies — suitable in schools both large and small — asked for this new Study which was prepared by the N. V. G. A. for the Guidance Field. It is authoritative and presents the information in a most useable manner.

Salient Features of this Printing Study

1. Prepared under the supervision of the N. V. G. A.

2. Author has been industrial investigator for U. S. Government; editorial writer for A. L. A. Booklist; and finally, teacher, counselor, and for five years in charge of the Industrial Studies Division of the Vocational Guidance Bureau, Chicago, when several Studies on the Printing Trades were written by her.

3. Specially prepared for (a) Social Science classes in Junior and Senior High Schools, (b) Industrial Arts Printing classes, (c) Printing Apprentices, (d) Vocational Advisers, and (e) School and Public Libraries.

4. Gives Occupational Information in the Printing Trades. Pictures industry in relation to our economic organization.

5. Teaches readers how to gather information for themselves and undertake the elements of simple research.

Important for Industrial Arts Classes

THE PRINTING TRADES AND THEIR WORKERS is admirably suited for Industrial Arts classes. It fills a long felt need as regards the exploratory purpose, and is written and illustrated especially for the guidance of secondary school pupils.

DR. WILLIAM E. WARNER, Ohio State University.

132 pp., 5x8, 66 illus., cloth, $1.40

Examine books at our Booth No. 7, A. V. A. Convention, Kansas City, Dec. 7-10

INTERNATIONAL TEXTBOOK CO.

INTERNATIONAL TEXTBOOK CO.
Box 8904-D, Scranton, Penna.

Please send me on approval the books checked below:

☐ The Printing Trades and Their Workers
☐ Texts on the following subjects:

.....
.....
.....

I agree to return texts if not adopted or to remit for same.

NAME.....
POSITION.....
SCHOOL.....
ADDRESS.....

(Continued from page 8A)

fessionals, advanced amateurs, seniors, and juniors, and a number of special awards for bronze and pottery castings.

Teachers' Courses at Wausau, Wis.

A number of teachers' college and university credit courses are being offered in the vocational evening school at Wausau, Wis. The courses are self-supporting, since a charge of $3 is made for each credit.

New Vocational Building Opened

The first unit of the Mary Miller Vocational High School, Minneapolis, Minn., was opened in September. The new building replaces the former Central High School and houses the vocational courses for girls, as well as the boys' courses in printing, telegraphy, and commercial work.

Introduce New Vocational Courses

New courses in printing and metal work have been introduced in the high school at Winchester, Ohio. Each of the courses is intended to cover four years of work.

Trade School Has Large Enrollment

The trade school at Cleveland, Ohio, opened for the school year with 700 apprentices. This is a larger enrollment than last year. The courses offered journeymen depend upon the enrollment, 16 being required for a class. Journeymen students deposit $5 for the 15-week course, getting a $3 refund if they attend 80 per cent of the classes.

Extend Scope of National Rehabilitation Work

The National Rehabilitation Association, which is devoted to the promotion of vocational restoration of the disabled, has determined to carry on an extensive campaign to place the need for the restoration of the handicapped before the people of the country. It is the consensus of opinion, among the members of this association, that it is better to spend five or ten thousand dollars for rehabilitating a single case, than to carry the disabled person through life as a dependent.

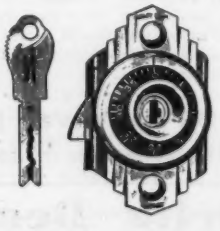
Data has been collected which shows that fully seven million people either are prevented through accident or disease from engaging in any occupation, or are forced to make a change in their vocation. The association, therefore, aims to secure the coöperation of all agencies, local, state, and national, in their efforts to educate the general public on the needs and opportunities in this field.

SCHOOL SHOP EQUIPMENT NEWS

FOR THE SUPERVISOR OR TEACHER WHO DESIRES TO KEEP ABREAST WITH THE NEWS OF NEW MACHINERY, TOOLS, SUPPLIES, ETC.

NEW DUDLEY DUALGUARD MASTER KEY

The Dudley Lock Corporation, 26 N. Franklin St., Chicago, Ill., has recently perfected a new Dualguard series of master-keyed combination locks. The key element in this lock is built on the Dualock principle, an advanced pin-tumbler design, which is absolutely pickproof and affords security to the user. The key, which is an exclusive Dudley design, can only be obtained from the Dudley Company. Each master key is registered and can be made to intermember key locks of the same design, so that it is possible to build up an entire school locking system in which key locks and combination locks are controlled by one registered master or grand master key.



Another feature of the Dualguard is the ease with which a supervisor can change any combination completely in a few seconds, without removing any part of the lock from the door.

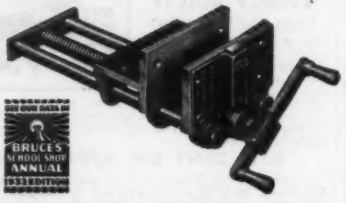
(Continued on page 13A)

The new improved

COLUMBIAN VISES

are the best "buy"

For School Shops

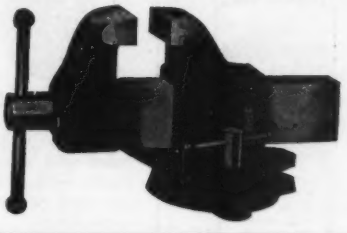


Continuous Screw woodworkers' vise equipped with new all-steel handle

When you buy Columbian you get vises designed for efficiency, streng h and durability. They will give a lifetime of satisfactory service. Let us send you information on the complete line.

The Columbian Vise & Mfg. Co.
9017 Bessemer Ave. CLEVELAND, O.

Unbreakable Swivel Base machinists' vise—ideal for shop use



The Western States line of Christmas Cards*

is now ready for distribution.

NEW DESIGNS
NEW STYLES
NEW CREATIONS
SIX SIZES

The personalized Yuletide greeting

Write for samples and folders.
There is no charge or obligation.

*School Printshops found this Yuletide greeting card service of special interest and value last year.

The Western States Envelope Co.
West Pierce St. at 16th Street Viaduct
MILWAUKEE WISCONSIN

Strike

while the iron is hot!

When a young fellow is eager to make things, give him the opportunity. When he asks for something to build, assign one of the many projects given in complete detail with photographs and easy-to-follow working drawings, in any issue of The Home Craftsman.

Each issue carries projects for beginners as well as one or two more pretentious projects you may care to build yourself. Every copy brings you a 17″ x 22″ blueprint.

Manual training instructors the country over are voting this new craftsman's magazine the greatest workshop help they've ever had. The November-December issue, just off the press, carries:

Night Table
Doll Cradle
Priscilla Cabinet
Silver Chest
Magazine Basket
Camel for Kiddies to Ride
Hope Chest
Hanging Cabinet
Christmas Toys
Foot Stool
Child's Desk Chair, and Stool
Corner What-Not

To acquaint you with it, we'll be glad to send a complimentary copy. Write to Dept. 2.

THE HOME CRAFTSMAN
Plainfield, N. J.

The School Shop Shopping Guide

Send today for our free illustrated catalogue of

HANDICRAFT SUPPLIES

You will find in it many worthwhile suggestions, as well as some new, unusual items for work in Leather, Metal, Wood, Model Boats, Archery, Art Printing, Iron Castings, Marionettes.

Fellowcrafters Inc.
739 BOYLSTON ST., BOSTON, MASS.

Shock-proof

HOLD-HEET GLUE POTS

Mica-covered element does not absorb moisture and "ground", conducts heat efficiently—is more accurate, saves electricity. This pot has become standard equipment in industry, now outsells all others. OK'd by Underwriters. Unconditionally guaranteed for 1 year, built to give 20 year service.

Sold by Jobbers	
1 qt.	$14
2 qt.	$17
4 qt.	$24
8 qt.	$36

115 or 230 Volts

30-DAY FREE TRIAL

Test this pot out in your own classroom before you buy. Just write size and voltage wanted. If it doesn't prove up, send it back.

RUSSELL ELECTRIC CO.
364 W. Huron St., Chicago, U.S.A.

"My Dipper FLEW 900 Feet"

"Dipper was packed the best I ever saw. Easily built—it flew over 900 ft. on its first flight!"
Bob Latas (Colo.)

EASILY BUILT!

Great For Beginners!

The Comet Dipper at 50c retail is the world's most famous FLYING plane! Rises off ground, weighs ¼ oz., easily built. COMPLETE kit has **everything** needed to build, fly! Made to order for instructors who want to give their boys the THRILL of building a plane that REALLY FLIES — and flies from 400 to 900 feet!

KITS SENT ON APPROVAL

To introduce the Comet line of **easily built, sure-flying kits**, we'll send Dipper **on approval** if you wish, **at 20% off retail price** of 50c, or only 40c per Dipper kit! SEND NOW! Free 24-page 5-color Catalog of kits priced from 50c to $1—greatest values in America! All FLY! Supplies illustrated. Hurry! **24-Hour Service! Satisfaction Guaranteed! COMET MODEL AIRPLANE & SUPPLY CO., 3114 Harrison, Dept. 1A-K 122, Chicago.**

NOW VENEER •• PROJECTS

for your classes

HJORTH, of the Saunders Trade School, Yonkers, N. Y., author of "Principles of Woodworking," has opened a whole new field of possibilities for the vocational instructor. No longer is it necessary to limit projects to solid wood. Now you can teach laminated construction, introduce really valuable projects in fine veneering—with results that equal the finest products of our leading furniture makers. Hjorth's text, "How to Make Veneered Panels," shows in workmanlike language and illustrations, exactly how veneers are cut; how veneered panels are assembled, glued and finished; and suggests new projects. A modern, inexpensive steel veneer press is described, and source of supply listed for needed materials. *Fourteen chapters, ninety-six pages, sixty-five illustrations.*

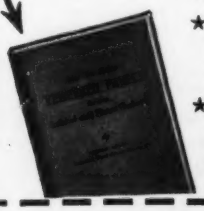
This clothbound book is being distributed without profit, $1.00, postpaid. Regular school board purchase orders accepted, if more convenient.

$1

Special Introductory Offer!

Frankly, we think this new book will promote veneering, and as a result sell more Casco Glue to Manual Training Schools. We cannot afford to give the book away, but for a limited time, a dollar's worth of Casco material will be given away with Hjorth's book...Here's what we send you *free* in addition to Hjorth's book, which in itself is splendid value for $1.00.

This offer embraces a complete education in modern cold gluing methods . . . Take advantage of it . . . Mail the coupon TODAY.



- ★ ½ lb. can CASCO Stain-free Glue (No. 2—white) offered specially for Manual Training needs.
- ★ 1 CASCO "Rapid-Spread" Glue Brush
- ★ New CASCO Red Book, 7th edition (the manual of factory use of CASCO Glue)
- ★ New CASCO Gluing Guide (over 50 uses for CASCO Glue, and how to make inexpensive waterproof Crack Filler).

1 A 12-32

The Casein Manufacturing Company of America, Inc.
205 East 42nd St., New York, N. Y.

Gentlemen: Please send Hjorth's "How To Make Veneered Panels" and combination free material. I enclose $1.00—check ☐ cash ☐

*Name*_____

*Street*_____

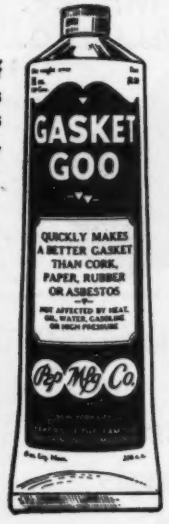
*Post Office*_____

*School*_____

FREE SAMPLES

for teachers of auto mechanics and their students

Teachers: How many students have you?



Write
PEP MFG. CO
INCORPORATED
33 W. 42nd St.
New York

ART METAL *and* JEWELRY WORK

Equipment and Supplies

Tools of all kinds for Jewelry, Silver, and Copper, Rose Hammers and Anvils.

Gold, Silver, Copper, Brass, Pewter, and Nickel Silver in sheet and wire form.

Semi-Precious stones. Send for our catalog.

METAL CRAFTS SUPPLY CO.
Providence, R. I.

INSTRUCTION SHEETS

NEW—ORIGINAL—UNIQUE

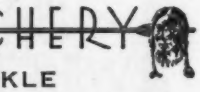
By C. B. Smith

UNIT SERIES I—WOODWORK—Includes ten Instruction Sheets (Black on White Prints) on common operations. See Tracing Supplements for sample. Price, $.35 per Set.

CLIFFORD B. SMITH
294 HASTINGS ST. BUFFALO, N. Y.

OSAGE

ARCHERY TACKLE



INSTRUCTORS!!! Students will enthusiastically and successfully make up fine Bows and Arrows using our quality raw material from America's largest plant. Send today for instructive 1932 Catalog of most complete line of Archery Supplies—Raw materials and Finished Equipment. Use school letterhead to obtain special school discount.

Outdoor Amusement Company
Dept. 14 **Clinton, Mo.**

SAW BLADES

Ruleta Saw Blades are all made with Filed Teeth, *not stamped like others*, with Round Back for easy turning OIL HARDENED AND TEMPERED. They cut fast and clean. Over three hundred (300) styles and sizes for metals, wood, celluloid, Bakelite, paper, bone, pearl, ivory, etc.

Fret Saws	Jewelers' Saws
Jig Saws	Puzzle Saws
Scroll Saws	Coping Saws

Send for catalogue and tell us your problem, and we will recommend the proper saw.

THE RULETA CO., INC.
91 Warren St., New York, N. Y.

DICTIONARY
OF TECHNICAL TERMS
F. S. Crispin

Contains more than 4000 definitions and 175 illustrations of words and expressions used in the school shop. *Price, $1.25.*

The Bruce Publishing Company,
Milwaukee, Wis.

POST
DRAWING INK

SMOOTH FLOWING, QUICK DRYING AND EXTRA WATERPROOF

BLACK
ORANGE
SCARLET
CARMINE
WHITE
BROWN
GREEN
VIOLET
YELLOW
BLUE
VERMILLION
INDIGO
BRICK RED

THE FREDERICK POST CO.
P. O. Box 803
CHICAGO

THE FREDERICK POST CO.
P. O. Box 803
CHICAGO

(Continued from page 10A)

NEW PEASE "JUNIOR" BLUE-PRINTING MACHINE

The C. F. Pease Co., 813 North Franklin St., Chicago, Ill., has announced a new "Junior" blue-printing machine with special reactor, for school use. The reactor takes the place of resistance

coils, formerly used in electric arc lamps, and it effects a saving of at least 25 per cent electrical current consumption when the machine is connected to alternating current.

The reactor not only cuts down the cost of electricity, but it increases the printing efficiency over that previously obtainable. A number of these machines have been successfully installed in high schools, vocational schools, and colleges of the country. With these machines blue prints, negatives, blue-line and brown-line prints, up to 24 by 36 in., may be made in one to one and one-half minutes. After the prints have been made, they are washed in the "Junior" sheet washer, which is equipped with spray pipe and drain pipe, eliminating the old-style open bath trays and consequent dripping prints and wet floors.

NEW DIXON ANADEL COLORED PENCILS

The Joseph Dixon Crucible Co., Jersey City, N. J., has announced its new line of Anadel colored pencils, which are designated as Assortment No. 122, and consist of twelve colors in a set.

The pencil may be successfully used over wet paper, or dipped in water, for unusual water-color effects. It is designed to work effectively for artists who prefer to sketch with dry colored lead, and then to apply a wet brush to the pencil marks. The colors of the Anadel line are exceptional because they are entirely soluble, which insures an even, uniform line.

"TRIPLE-DUTY" DRILL PRESS

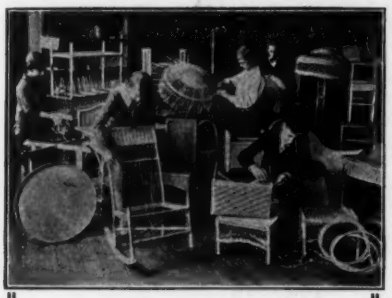
The new "Triple-duty" drill press just placed on the market by the Delta Manufacturing Company, of Milwaukee, Wis., has been designed to meet modern school-shop needs as well as 1933 school appropriations.

It is a very accurate as well as a versatile tool, despite its economical price. It is a floor-type machine, has a table travel of 43 in., will drill to the center of a 14-in. circle, and takes drills up to 17/32 of an inch with a standard Delta grip chuck. In addition to the regular equipment, spindles for Morse taper-shank drills, for standard machine bits, and for key-type chucks are obtainable. All spindles are interchangeable.

The mortising attachment permits the drill to be converted into a mortiser. The head may be reversed so that the machine can be used as a shaper, and the spindle speeds may be increased to 8,000 r.p.m. for routing.

The spindle and floating drive pulley are fitted with self-sealed, high-speed ball bearings, designed for speeds up to 12,000 r.p.m., thus insuring long life and continued accuracy.

The School Shop Shopping Guide



Teach Art-Fibre Furniture Weaving

Reduce Operating Costs Without Impairing Educational Standards

Weaving is acknowledged as the ideal hand training medium and Art-Fibre Furniture Weaving is the most practical form of this valuable art. Results are quick and positive. Enthusiasm is kept at a high pitch, classes are attentive and parents coöperate because the finished project is a welcome addition to their home furnishings.

Only a few simple household tools are used. Power bills and expensive machinery are eliminated. All expense is for materials and these are sold at the lowest prices in history.

Investigate This Timely Work

Write for our 1933 catalogue of Designs and Materials illustrating nearly a hundred furniture projects your classes can make.

Address Department "A"

GRAND RAPIDS FIBRE CORD COMPANY

609 Myrtle Street, N.W.
Grand Rapids, Michigan

LIBITE *Instantaneous*

Type Cleaner & Ink Remover

Performs a miracle in rapidly removing ink and other accumulations from type forms, plate base, electros, halftones, ink fountains and for all general wash-up purposes. Qt. $1—Gal. 2.50—5 Gal. @ $2

PERFECTION TYPE, Inc.
702 Manhattan Bldg. - St. Paul, Minn.

PEWTER

AND BRITANNIA METAL

Sheets: 24"x36" or smaller
Circles: 2" to 24" diameter
Specify size and gauge.

NATIONAL LEAD CO., DEPT. P
New York Chicago St. Louis

TRAINING TEACHERS

Attention!

MODELS

We are offering special concessions to teachers to acquaint them with the superiority of Selley's Construction Kits of scale and flying models for class work.

Please send in for FREE catalogue of the worlds' finest model airplanes and accessories—without obligation.

SELLEY MANUFACTURING CO.
1377 A Gates Ave. Brooklyn, N. Y.

COLARK

MINIATURE

SPINNING WHEEL

$1.00 POST PAID

Furnished ready for assembling. Each part carefully cut to exact size, smoothly sanded so it can be colored or enameled. Elegant for mantel or radio, beautiful gift for the holidays. Can easily be equipped with lamp and shade. Send check or M. O. with order.

SIZE
Height Overall
10½"
With Oval Base
8½" x 6½"

COLARK SHIP MODELS

Dept. "5" 6330 N. Gratz St., Philadelphia, Pa.

Printers Supplies

Safety appliances for Platen Presses; Gideon Grippers; Ink Rollers; Complete Printing Plants—Outfits for schools or students. Write for catalog. Another source of supply

Globe Type Foundry, Est., 1904

523 SOUTH GREEN STREET CHICAGO ILLINOIS

ELECTRO-TYPERS

Especially qualified to be of service to the school printshop.

Promptness and quality assured.

Forms returned same day received.

Badger Electrotype Co.

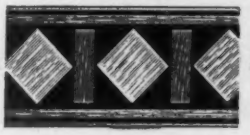
600 Montgomery Bldg.
407 East Michigan St., Milwaukee, Wis.

Materials for Brush Making

Brush Fibres, Tampico, Fibre Mixtures, Sterilized Horse Hair, Hair, Bristle and Tampico mixtures solid or taper stock, original lengths cut to size. *Samples matched.*

E. B. & A. C. WHITING CO.
Burlington, Vermont

INLAY



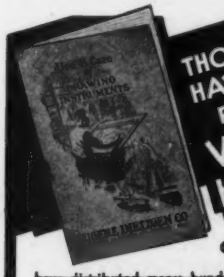
INLAY

THE ART OF INLAYING IS A NECESSARY PART OF A COURSE IN WOODWORKING.

Pamphlet on history and method of inlaying with complete catalogue of designs and 60 actual samples. Special to schools—25c (regular $1.00), refunded with orders.

Marqueterie Corporation

192 Lexington Ave. New York, N. Y.



THOUSANDS HAVE ASKED FOR THIS VALUABLE HANDBOOK

THOUSANDS OF INSTRUCTORS

have distributed many hundreds of "Use and Care of DRAWING INSTRUMENTS" to their classes.

Saves time for Instructor and Student for it quickly acquaints student with tools he is to use. It tells how each instrument is used .. how to properly care for them.

SEND FOR A SUPPLY. FREE FOR DISTRIBUTION TO YOUR ENTIRE CLASS.

EUGENE DIETZGEN CO.

Enduring worth at reasonable cost

Chicago New York Philadelphia Washington
New Orleans Pittsburgh Milwaukee Los Angeles
San Francisco Factory at Chicago

Manufacturers of Drafting and Surveying Supplies

MAKE YOUR OWN CUTS

—with Hoke's Patented—

"CHALK PLATE PROCESS of ENGRAVING"

The Best—Cheapest—Speediest and Most Simple of Operation—Non-Chemical Method of Making Cuts for cartooning and illustrating.

With this method no special training is necessary. Any person who can draw an illustration will be capable to make his own cuts efficiently.

Write for Catalog and Prices.

HOKE ENGRAVING PLATE CO.

1024 Park Ave. St. Louis, Mo.

Read the Chalk Plate Engraving article in the September issue of this magazine.

MARQUETRY

Artistic Inlaid Veneer to decorate Furniture, Trays, Mirrors, Boxes, etc., in the most beautiful way. SELECTION SENT ON REQUEST

KAI LARSEN

Maker of Highest Grade Marquetry

493 Page Boulevard Springfield, Mass.